Purchasing control : performance measurement and evaluation of the industrial purchasing function

PURCHASING CONTROL: PERFORMANCE MEASUREMENT AND EVALUATION OF THE INDUSTRIAL PURCHASING FUNCTION

PROEFSCHRIFT

ter verkrijging van de graad van doctor in de technische wetenschappen aan de Technische Hogeschool Eindhoven, op gezag van de rector magnificus, prof. dr. S. T. M. Ackermans, voor een commissie aangewezen door het college van dekanen in het openbaar te verdedigen op dinsdag 17 januari 1984 te 16.00 uur

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Arij Jan van Weele

geboren te Amsterdam

krips repro meppel

This dissertation has been approved by:

the first promotor, Prof. Ir. C. H. V. A. Botter
the second promotor, Prof. Ir. H. Bosch, M.Sc.

To Huug Hage

"I write first of all for myself. That is how I learn."

Henry Mintzberg, The Structuring of Organizations,
Prentice Hall, Englewood Cliffs, 1979.

Acknowledgements

When the Dutch Association of Purchasing Management (NEVIE) in May 1979 asked me if I would participate in a study on Purchasing Performance Measurement, I was surprised for two reasons. Purchasing was an area which I barely knew and until then my personal contacts with this association had been very limited. The other reason was that my major interests were in the field of industrial marketing and I did not see how this research project related to that area.
However, I gladly accepted the offer due to the fact that it promised many contacts with industrial companies. I still owe Jacques de Rijcke for having recommended me for this project.
Collecting material for the research, I became more and more interested in purchasing management. Used to ample literature and research reports in marketing, I felt the documentation on purchasing disappointing. Gradually I began to understand the importance of this business function. Material from the Central Bureau of Statistics showed that purchased materials on average contributed to 56.3% of total end-products cost. I began to recognize the importance of this finding. I also recognized that the buyer-seller interaction had been observed by researchers rather opportunistically. One of the parties, the seller. I knew quite well, since marketing- and sales management had been a major during my study in Business Administration. However, for one reason or another, the other party's interests seemed to lack any interest from scientific researchers. This I found remarkable since, this party was handling at least the same amount of money as his counterpart. Gradually the conviction grew that the purchasing function in industrial companies was to be considered as a business function, which was vital to the success of the company. This underlined the relevance of the subject to me. The study, which started as a part time activity, gradually took most of my research capacity.

To overcome my lack of experience in purchasing it was suggested that I did a traineeship at two major companies. During two months I followed the practices of purchasing practitioners at Philips-ELA at Breda and Hyster Truck Company at Nijmegen. I am still indebted to these enthousiastic

people, who diligently and patiently explained the intricacies of their work. Thanks to them I got familiar with the ample purchasing vocabulary, which appeared to be very valuable afterwards, when conducting the interviews for this study.
Although a study like this for an important part is a single man's job, it cannot be completed without the willing assistance of many people.

In this way I want to express my gratitude towards my former colleagues at Eindhoven University of Technology, who were a great environment to work in. I am especially indebted to Hein van der Hart, who more than once guarded me against overload and who often successfully reduced my plans to realistic levels.

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The moral support and personal guidance of Professor C.H. Botter is directly responsible for the successful completion of this study.
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Also I want to thank Aart van Gent and Professor C. van der Enden for their support in completing this research project.

It is clear that this report, like any report, cannot be printed, without professional secretarial assistance. I am most grateful in this respect to Marjon van Tol, who diligently did the word-processing. I have experienced that her skillful work is a major asset for any researcher at Nijenrode.

In closing I should mention the care of Ineke, my partner and wife, who always would remind me to my often optimistically established targets and who always would let me know when time was up.

Through this study I hope to contribute to a greater recognition of the purchasing function. While many have contributed to the completion of this study, I alone assume responsibility for its contents and for any errors or misrepresentations.

Maarssen, December 1983

Arjan J. van Weele

Contents

CHAPTER ONE: INTRODUCTION

1.1 Statement of the problem

Compared with the marketing profession, the purchasing profession has up until now received only limited attention. This applies to business practice as well as to academic research.

Many consumer and industrial goods manufacturers have introduced marketing thinking in their product- and business philosophies and many challenging concepts have been developed in marketing theory. However, not much progress has been made in this respect in the field of purchasing.

Whereas marketing planning is integrated in corporate strategic planning, there appears to be an almost complete absence of attention in the literature regarding procurement and materials management and their relationship with corporate planning (Adamson (1980), p. 27). Furthermore, the academic interest for the marketing profession may be demonstrated by the numerous articles and textbooks, which have appeared in this area. In contrast to this, the purchasing profession has gained only limited acceptance as an area of scientific research. This is illustrated by the limited number of journals which specifically deal with purchasing issues (1) and the relatively small number of purchasing textbooks.

Part of the explanation for the lack of interest for the industrial purchasing function may possibly lie in the fact that purchasing and selling have, up until now, been regarded as totally different business activities. One may wonder, however, to what extent this different perception is justified.

Of course differences between purchasing and selling exist. As is described in more detail in Chapter Two, a major difference is that purchasing and selling have a different place and function in the company's materials requirements planning process. In literature purchasing is often designated as a back-end activity, which receives input from internal requisitioners belonging to earlier stages of the materials cycle. In this perspective selling is considered as a "front-end" activity, receiving its input from parties outside the company. As a consequence purchasing and selling processes differ with regard to uncertainty and complexity.

On the other hand, purchasing and selling have much in common:

- both activities are essentially directed at the exchange of values between two or more parties, outside their own organization; the result of this exchange process is the buy-sell transaction;
- both activities are directed externally i.e. directed at parties outside the company;
- both activities cannot be executed satisfactorily without a thorough knowledge of markets, competition, prices, technologies and products;
- due to the amount of money involved in selling as well as purchasing agreements, both activities exert considerable influence on the company's financial results; they are therefore sometimes are designated as "risk-areas for profit" (Davies (1974)).

In spite of these similarities the purchasing profession often lacks the systematic approach underlying marketing activities. There are several reasons for this (Adamson (1980) p. 28):

- following World War II, productivity outstripped demand resulting in more marketing problems than buying problems;
- purchasing has been an isolated function in the organization, not attracting much attention;
- purchasing does not have the "glamour" that marketing has;
- purchasing personnel have been passive due to the fact that they have not controlled many of the strategic decisions (or perhaps, they did not realize, they did);
- many purchasing decisions include considerations based on judgment, making them resistant to quantitative decision models.

However, the purchasing literature and the practices of some large multinational companies give evidence of the fact that, due to changes in the purchasing environment, companies are forced to review their purchasing policies (2). A recent McKinsey-research paper designates the availability of key materials and/or components "as a primary threat to be dealt with" (Kraljic (1981) p. 1). The increasing resource depletion and scarcity, the potential instability and government intervention in many critical supply regions such as Africa or the Middle East, and the growing competition of major industrial nations for scarce raw materials resources have made purchasing policies more complex. When

discussing material shortages. Aggarwahl (1982), p. 6) differentiates between artificial and real shortages. The former relate to shortages resulting from consumer pressures or from political and military developments. Real shortages relate to the actual depletion of non renewable resources such as oil, cobalt and chromium.

Beyond this issue, more and more companies are facing a growing number of other issues relating to strategy and operations, such as:

- the impact of changing technology, such as the micro-processor/ electronic explosion or biotechnology;
- productivity of assets, with issues such as cooperative manufacturing, make versus buy decisions, materials requirements planning etc.
- management of future cost position relating to future raw material cost, energy management and product quality
- flexibility of decision making with the need for flexible operating systems and short turn around times.

Many of these issues relate directly or indirectly to purchasing. For instance, new technologies will lead to new applications in production processes and new products; this will ultimately lead to other (worldwide) sources of supply and other skills to buy these products. The concern over the future cost position may lead to more intense relationships with major suppliers. These may result in more efficient materials requirements planning, lower transportation costs etc.. Companies may be required to work together more closely in the field of new product development (this is already being practised by some major computer manufacturers, who work closely together with their micro-processor suppliers e.g. IBM and Intel).

Considering the changes in the purchasing environment it is being suggested here that the purchasing function is entering a new, more demanding strategic era.

1.2. Purchasing influence on company results

The potential impact of the purchasing area on the company's financial results is generally considered to be fairly large: as figures of the Central Bureau of Statistics (CBS) show (see Exhibit 1.1.), purchased materials in Dutch industry amount on average to approximately 55% of the end-products' cost-price.

INDUSTRY		1978	1979	1980
20/21	Foods and kindred products	68.6%	68.0%	68.3%
22	Textile Mill Products	52.5%	53.0%	53.6%
23	Clothing industries	57.3%	58.7%	70.6%
24	Leather and footwear	48.1%	49.7%	49.4%
25	Lumber and wood products, furniture	47.3%	49.7%	49.4%
26	Paper and allied products	50.2%	52.1%	54.8%
27	Printing and publishing	47.1%	47.3%	47.4%
29/30	Chemical and allied products	51.1%	55.5%	56.1%
31	Rubber and plastics industry	47.1%	49.8%	50.1%
32	Construction and construction materials industries	32.3%	33.1%	35.1%
33	Primary metals industries	44.5%	45.7%	52.2%
34	Fabricated metals industries	47.2%	47.6%	48.3%
35	Machinery	44.2%	44.0%	45.2%
36	Electronic equipment supplies	44.4%	46.7%	48.2%
37	Transportation equipment	57.0%	58.0%	58.2%
39	Miscellaneous	39.8%	43.3%	42.5%
TOTAL DUTCH INDUSTRY		54.4%	55.3%	56.3%

Exhibit 1.1. Purchasing value (incl. changes of inventories, excl. energy) expressed as a percentage of production value for Dutch industry (Source Central Bureau of Statistics (1982)).

Due to the relatively large share of purchased materials in the end- products cost, changes in purchasing expenditure have a significant effect on the company's return-on-investment. This can best be illustrated by the Du Pont-chart (see Exhibit 1.2.). As can be seen from Exhibit 1.2., a 3% reduction in purchasing cost directly affects Return On Investment, which increases, in this example, from 12.5% to 16.25%. As can be seen from the Exhibit the relationship between purchasing cost and return on investment depends among others on:

- investment turnover and

- purchasing's share in end product cost (it has been assumed here that the Dutch industry average is 55%).

A reduction in purchasing cost will have a larger impact upon the company's financial performance if the investment turnover is high. A similar comment can be made for companies with a high purchasing share. As will be evident, this impact may work out both negatively and positively for the company.

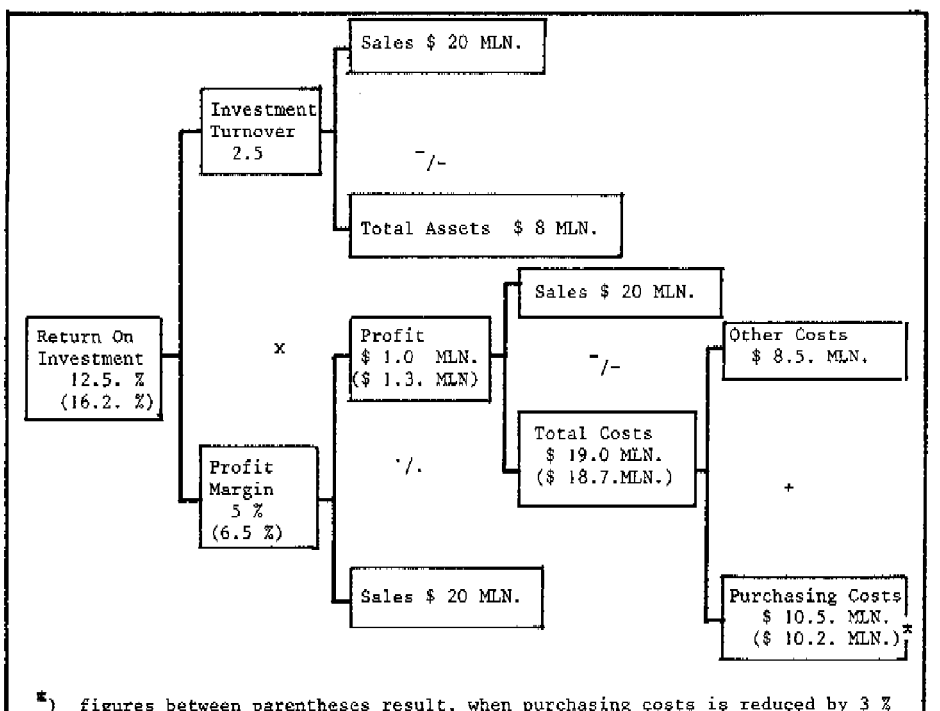

Exhibit 1.2. Effect of a 3% Reduction of Purchasing Cost on the Company's Return on Investment.

An important issue behind this kind of reasoning is the potential that exists for improving activities i.e. reducing the cost of purchased materials cost. As

will be explained further in this study, purchasing activities are restricted to a large extent by external and internal constraints. To mention a few:

- purchasing agents may be forced by company policy to buy from approved vendors only;
- purchasing agents may be forced to source certain parts internally, whereas more attractive suppliers may exist outside the company;
- in oligopolistic markets prices may be controlled by cartels or price-agreements between suppliers;
- technical specifications may be stated by engineering in such a manner, that parts can be purchased from only one supplier;
- reciprocal agreements may lead to a priviliged position of one supplier.

Purchasing's share in the end-products' cost-price per se is, therefore, not a measure for the importance of the purchasing function of a specific company. It should be considered together with the potential that exists to reduce costs in the purchasing area.

Often constraints on purchasing are many in practice and for this reason we think that opportunities exist for improving purchasing performance. In doing this, purchasing management could focus first on those activities which influence company performance most. However, the problem in this matter is how purchasing's contribution towards the goals and objectives of the company can be identified or measured. What instruments are available in this respect and what philosophy should underlie attempts to measure and evaluate purchasing activities?

In answering these questions, reference to the available literature proves to be of comparatively little use. Much of what has been written about purchasing performance measurement and evaluation provides few consistent answers. The subject has been discussed in most cases from a rather practical point of view and a general theory underlying the subject is unfortunately not present. Another important omission is that the literature on purchasing performance measurement and evaluation has evolved independently from management control theory. This is disappointing since many valuable insights have been developed in this area during the last few years. Although studies, dedicated to the subject of purchasing performance measurement (or preferably more broadly defined as purchasing control), have concluded that one general yardstick for measuring

purchasing performance cannot be found, research has not proven to be capable of providing useful guidelines. Most contributions on this subject stem from the Fifties and early Sixties and since then little progress has been made. There is however, significant interest for the subject, which can be derived, for instance, from the fact that in 1978 a two-day congress was held by the Dutch Association of Purchasing Management (NEVIE). The subject of the congress was "The Contribution of the Purchasing Function to Company Performance". The question of how purchasing performance should be identified and measured was put forward during this congress as one of the major problems in evaluating purchasing activities. The same kind of questions came up more recently on a one-day seminar organized by the Dutch Association for Materials Management (NEVEM) together with Kearney International on Productivity Measurement in Logistics. These and similar developments encountered in purchasing practice indicate that there is a definite need for a thorough study of evaluating purchasing performance.

1.3. Purpose of the study

The objectives of this study have been more particularly to provide an answer to the following questions.

- Who were the main contributors to the development of a theory of evaluating purchasing performance and what were their concepts?
- To what extent are concepts, as developed in management control theory, reflected in the contributions dedicated to purchasing performance measurement?
- What methods and techniques are used in Dutch industry to measure and evaluate purchasing and how are they valued?
- To what extent are concepts, as developed in purchasing literature to measure and evaluate purchasing performance, reflected in methods and techniques used in industrial practice?

- To what extent is a general theory on purchasing measurement and evaluation feasible and what are the practical implications of such a theory?

Furthermore this study is designed to serve the following purposes:

- provide in clear definitions of concepts which are being used in theory and practice on purchasing performance measurement;

- contribute to a further development and recognition of the industrial purchasing function.

It is felt that purchasing theory can only contribute to a further development and recognition of the industrial purchasing function, if concepts that have been developed have a clear relevance for purchasing practitioners. For this reason the approach presented here should be commented on from a practical point of view.

1.4. Limitations

This study is concerned only with the industrial purchasing function. Purchasing of a governmental nature, purchasing for non-profit organizations as well as purchasing for retailers and industrial trade are beyond the scope of this study. This limitation has resulted from the fact that purchasing policies and procedures tend to differ to a large extent among these five categories of organizations. Consequently, the empirical research, conducted within this study, has been limited to industrial manufacturing companies within The Netherlands.

As will be shown in this study, control-processes can be described at three different organizational levels i.e. the strategic, the tactical and the operational level (see Chapter Two). After an analysis of the prevalent literature, however, it was decided to incorporate in the empirical research only those control-procedures, which were aimed at measuring and evaluating industrial purchasing performance at the operational level.

1.5. Methodology

The following steps have been made in conducting this research project.

- Existing purchasing literature was inventarized to obtain an insight into the degree to which the subject of purchasing control had been covered. This survey has revealed various publications. Most literature appeared to be of American origin. In Dutch literature only two publications have been found (Dijkers (1976) and (1980)).

- This information has been investigated to determine if the subject of purchasing control was a major problem. The survey indicated that this area did apparently constitute a problem.

- The development of the present theory of purchasing performance was traced and documented from journals and textbooks.

- Contemporary industrial purchasing practice was covered by:

  . data results from a survey, in which 206 Dutch manufacturing companies participated. This questionnaire was meant to gain insight into the extent to which the importance of the purchasing function differed among the various industries

  . data results from a survey among 72 industrial companies in The Netherlands to obtain information about the nature of the techniques used to evaluate purchasing activities;

  . in-depth interviews with purchasing managers and buyers of 23 industrial companies to obtain background information about the value of the techniques that were used in that particular company to evaluate purchasing activities.

- Contemporary management control theory has been identified by a review of numerous textbooks and periodicals on this particular subject.

- The theory of purchasing performance measurement was compared with contemporary management control theory. This comparison permitted various conclusions relating to the specific objectives of this study.

1.6. Scope and importance of this study

The results of this study may be relevant for all those who are interested in industrial purchasing management. These may include general managers, purchasing practitioners and industrial marketing managers. Also researchers may find new ideas on purchasing performance evaluation and recommendations for future research.

Purchasing control is considered as an essential step in the purchasing management process. As others have put it: without control there can be no planning. The relevance of purchasing plans depends on the extent to which information on actual results is fed back to previously made plans. If this feedback is not provided, plans will appear to be little used and they will be considered as a "nuisance" by the people who should compile them. Purchasing control should be designed to monitor purchasing performance, to identify variances between plans and actual results, to provide information concerning the causes for these variances, and to provide guidelines for corrective action. Purchasing control, should make things visible for those who work in the purchasing department. Making things visible is referred to here as purchasing performance measurement and evaluation; it relates to the techniques and measures used to monitor purchasing activities. As will become clear in this study performance measurement and evaluation in the purchasing area is a delicate matter due to the many intangible elements involved. Nevertheless, in this study a systematic approach to this issue has been presented, which may enable buyers to improve their performance.

This study is also felt to be relevant for those who are engaged in industrial marketing and selling. Due to the present economic depression, sales opportunities in industrial markets have declined considerably. Due to

management pressure on materials costs, many industrial buyers have become more sceptical about products offered by suppliers, and, more important perhaps, about the prices they have to pay.
To be able to direct their marketing efforts more effectively, industrial marketers need to know more precisely which people in the customer organization are involved in the industrial purchasing decision process. This appears to be a far from simple subject, about which few generalizations can be made. The role of the purchasing department in this process is especially important. Research has shown that the role of the purchasing department tends to differ among industrial companies depending on the stage of purchasing decision process, the nature of the material to be purchased, and the specifics of the purchase situation.

Here, we would like to add another variable: the role of the purchasing department in the future will depend more and more on its professionalism. Professional buyers, who know their markets, products, suppliers and technology and who understand how purchasing can contribute to the competitive position of the company will be valuable human assets to their employer. It is felt here that purchasing control and purchasing performance measurement can contribute significantly to the professionalism of industrial buyers. Industrial marketers should know where buyers put their priorities, what criteria they use for evaluating suppliers, what pressures the buyer is going through. These elements are described in this study. Understanding them may lead to better insight in how industrial buyers operate and hence may lead to improved marketing strategies.

1.7. Structure of this study

This study is focused on methods and techniques, which can be used to evaluate purchasing activities of industrial companies in order to improve the effectiveness and efficiency of the purchasing function.
To gain a better understanding of how purchasing departments of industrial companies work, Chapter Two describes the elements of the purchasing management process. Furthermore the purchasing planning cycle is discussed. Finally the purchasing process is commented on in this Chapter from a managerial and a marketing point of view.

Chapter Three describes some major contributions as developed in management control theory. Attention will be given to the management-planning and control process, and to the levels of control as distinguished by several authors. Furthermore, the implications of management control theory for purchasing related issues are discussed.

Chapter Four deals with the question of who the main contributors were to the development of a theory of evaluating purchasing performance. The contributions of several authors are discussed as well as some empirical studies, which have been conducted in this field. Furthermore, in this chapter an examination is made of the extent to which concepts as developed in management control theory are reflected in the purchasing literature on purchasing control.

Chapter Five presents an overview of the most important techniques found in literature to monitor purchasing prices, quality of incoming goods, timely delivery and delivered quantities. Limitations and benefits of the various methods are discussed here.

Chapter Six focuses on the empirical research, conducted within the scope of this study. Numerous techniques, found in a sample of 72 Dutch industrial companies to evaluate purchasing activities, are described. Some results of an additional survey among 206 Dutch companies are also presented here. Furthermore, attention is paid to the appreciation of these techniques by purchasing practitioners i.e. purchasing managers and individual buyers. Lastly in this chapter, attention is given to the extent to which concepts, as developed in theory, to measure purchasing activities, are reflected in the methods and techniques used in industrial practice.

Based upon our literature survey and empirical research, Chapter Seven provides a conceptual approach for assessing and evaluating purchasing activities. Attention is given to such questions as: why should purchasing activities be measured and evaluated, and what problems occur in measuring and evaluating purchasing activities. An attempt is made to define the concept of purchasing performance. For this purpose a distinction is made between purchasing effectiveness and efficiency. These concepts are broadened by discussing the

goals and objectives of the purchasing function. As will be shown, purchasing's responsibilities and authority need to be enlarged in order for purchasing to contribute most to company performance.

The concepts, as developed in Chapter Seven, are materialized in Chapter Eight. In this chapter new approaches are presented towards price performance measurement and evaluation, measuring purchasing's contribution towards the quality of purchased materials and controlling the incoming material flow.

As is demonstrated in Chapter Nine, purchasing performance cannot exist without reliable suppliers. In order to be able to produce efficiently, purchased materials and services need to be supplied in time and in the right quantities. Moreover, they should meet the required specifications.
Reliable suppliers are valuable assets to the company. Therefore their performance on delivery-reliability and quality should be closely monitored. In this respect several supplier evaluation systems are described in chapter Nine.

In Chapter Ten the major conclusions of the study are summarized.

Notes to Chapter One

1. An exception is the Journal of Purchasing and Materials Management.

2. See for instance Meitz and Castleman (1975), Pestel (1977), Adamson (1980), Kraljic (1981) and Aggarwahl (1982).

CHAPTER TWO: THE PURCHASING MANAGEMENT PROCESS

2.1. Introduction

Purchasing processes within industrial companies can be considered from several perspectives. The purpose of this Chapter is to provide some of these to provide more insight into how purchasing processes work and how they are interrelated to the other functional areas.
First, purchasing processes are considered from a managerial point of view. In doing this the role of purchasing control in the purchasing management process is described.
Secondly, purchasing's role in the materials planning cycle is described.
Thirdly, purchasing processes are considered from a decisionmaking point-of-view. As we will see purchasing processes may relate to three different types of buying situations.
Purchasing processes may also relate to a variety of products. Therefore, a classification of purchased products is proposed, which will serve as a term of reference for the remainder of our study.

2.2. The Purchasing Management Process

In Chapter One the similarities have been discussed between the marketing and the purchasing profession. Similar to marketing management, the purchasing management process can be described as

"the analysis, planning, implementation and control of programs designed to create, build and maintain beneficial exchanges with suppliers in order to secure the short and long term purchasing needs of the organization in such a way that its competitive position is improved."

Some aspects of this definition require special emphasis:

- we consider the purchasing function to be an active, market oriented management activity; rather than a reactive and clerical activity;

- due to purchasing's large share in end-product cost, we designate the purchasing function of industrial companies as an area of strategic importance. This implies that, through constantly looking for opportunities to increase the value of purchased products, the purchasing function can adequately contribute to the competitive position of the company on its end-use markets;
- purchasing is considered here to be long term oriented. Of course, short term needs should be adequately met. However, purchasing's responsibilities go beyond its day-to-day operations in that it should secure the company's long term materials requirements. In this respect industrial purchasing differs fundamentally in scope from the retail buying; industrial buying is more long term oriented and is focused on long term relationships with suppliers;
- due to this long term orientation good vendor relations are very important in that they should constantly be optimized and refined.

This definition, which has been influenced by the marketing background of the author, can be considered as different compared with those found for example in major purchasing textbooks. .Representative for the way in which the purchasing function is described is the following quotation of Harold Bloom, in George Aljian's Purchasing Handbook ((1973) (1-3)).

"'Purchasing' is the term used in industry and management to denote the act of and the functional responsibility for procuring materials, supplies and services. In a narrow sense, the term "purchasing" simply describes the process of buying; however, in a broader sense, the term involves determining the need, selecting the supplier, arriving at proper prices, terms and conditions, issuing the contract or order, and following up to ensure proper delivery. In simple terms the basic elements involved in performing the purchasing function are obtaining the proper equipment, material, supplies, and services in the right quality, in the right quantity, at the right price, and from the right source".

This definition, which has become popular as the four "rights"-definition (sometimes up to seven, depending on the author), for many years has determined the scope of the purchasing function. Our criticism however, on formulating the scope of purchasing in these terms are:

- it suggests that purchasing is a rather short term oriented activity; if the purchasing function meets the four (or seven) "rights" its purpose is fulfilled; as a consequence the purchasing function may be considered as a rather clerical activity (which it often is (see Davies (1974), Adamson (1980), Faes and De Rijcke (1982));
- these statements do not reflect the strategic importance of purchasing to industrial companies; they do not relate purchasing to the company's competitive position in end-use markets;
- some of these statements may evoke the impression that purchasing is an isolated function, which can be managed separate from other functional activities, whereas, in our opinion, the opposite is true.

As we will see later in this study, a clear understanding of the "scope" of the industrial purchasing function is important, since this to a large extent determines the measures by which purchasing is valued and evaluated.

Exhibit 2.1. provides an overview of the various elements of the purchasing management proces.

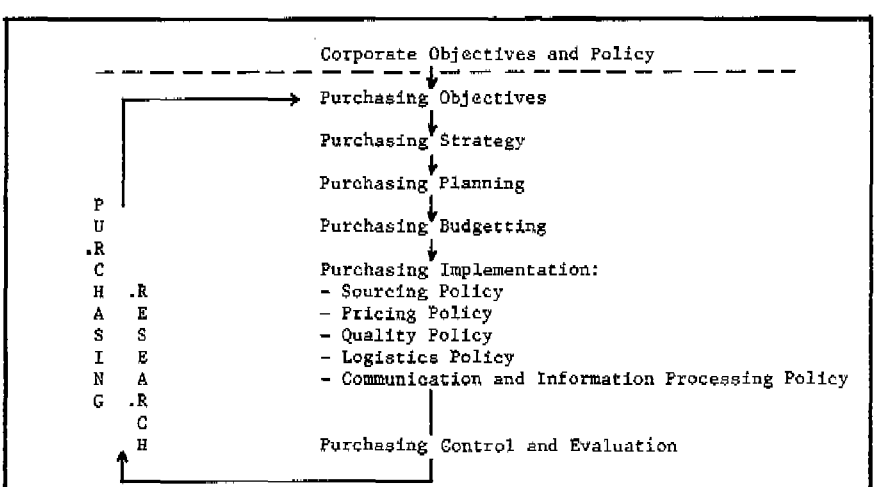

Exhibit 2.1.: The Purchasing Management Process.

As can be seen from this Exhibit, the corporate objectives and strategies, set the stage for purchasing management. Purchasing objectives and stategies should be consistent with overall corporate policy.

A distinction is made between purchasing strategy, purchasing planning and purchasing budgetting:

- Purchasing strategy. This is directed towards identifying future problem areas. For instance: if corporate policy is to develop or integrate digital-computer technology in the own product-line, purchasing strategy may consist of a supplier-development program. In such a program criteria are set for prospective suppliers, who are invited to participate in the company's new product development programs. Other examples of long term purchasing strategies are:
  - shift from make to buy
  - shifting vendors from one geographic area to another (due to changes in exchange-rates of foreign currencies)
  - supplier development programs in terms of zero-defects and on-time deliveries (in order to meet own plans to realize materials requirements planning programs) etc.
- Purchasing planning. Purchasing strategies set the framework for purchasing action plans. Within this framework specific, time-phased steps should be taken. For instance if the company has decided to focus on "buy" versus "make", priorities need to be established to what products should be considered first, research needs to be conducted to investigate possibilities to source products in the supplier market, etc. These plans are much more short term oriented than strategies. They indicate what should be done, by whom and what date and against what cost.
- Purchasing budgetting. Finally, the financial consequences of the purchasing action plans should be laid down in a budgetting procedure. These budgets should serve as a terms of reference for the implementation stage of the purchasing management process. Afterwards, they may provide in a (financial) evaluation of how purchasing plans were executed.

As can be seen from Exhibit 2.1, the Implementation Stage has many aspects. These will be discussed in more detail further in this study. Here, we only provide a short description of each policy area:

- Sourcing Policy in general terms refers to the relationships with suppliers, the criteria which are used in supplier selection, and the criteria which are used to evaluate supplier performance;

- Pricing Policy refers to how material prices are being negotiated, monitored and evaluated;
- Quality Policy refers to the measures being taken to improve the quality of purchased materials by value-analysis, quality control, etc.
- Logistics Policy deals with assuring the timely supply of purchased materials and the quantities needed;
- Communications and Information Processing Policy is directed towards improving the effectiveness and efficiency of the internal organization; it may apply to the purchasing department only, as well as to the relationships between this department and other functional departments.

Finally, the last step in the Purchasing Management Process is control and evaluation. This stage is oriented towards identifying variances between purchasing plans and implementation. Furthermore at this stage, the possible causes of these variances are identified and analysed.

As will be clear, purchasing control is not an isolated stage in the purchasing management process. It is an integral part of it.
In order to be effective, purchasing planning needs to precede purchasing control. If purchasing plans do not exist, or targets are stated in too general terms, this will affect the effectiveness or adequacy of purchasing control.

2.3. Materials Requirements Planning

In this section we would like to discuss how purchasing requisitions actually do originate. In our discussion we closely adhere to the ideas of Collins, Van Dierdonck and Vollman (1981). As can be seen from Exhibit 2.2., the materials planning process starts with the sales-forecasts, which are made annually by the marketing or sales department. The Demand Management module comprises all of the activities that place demand for products on manufacturing, orderprocessing, the assignment of delivery promises, and physical distribution.
These requirements are then translated into a Production Planning, which represents an "agreement" between marketing, manufacturing and finance as to what will be produced and made available to customers. Through the Resource Planning Module the long range sales forecast and the production planning are translated into estimates of required manufacturing facilities. The result of Resource Planning is the identification of the capacity limits within which the

production planning activity must operate. It also provides the basis for capital budgetting.
The Master Production Schedule integrates the information from all other modules. It provides a production schedule, reflecting the production capacity limitations, raw material availability and production capacity utilization.
Information from the Master Production Schedule, Bills of Material and Inventory Control System are fed into the Materials Requirements Planning Module. This Module produces the time phased requirements for the end products. These time-phase requirements relate to the subassemblies, components and/or raw materials, considering available inventories or open orders. This finally results in orders to be released in the shop as well as orders to be released through purchasing.

Finally, the materials requirement system is comprised of routines and procedures, that issue, schedule, monitor, and prioritize actual orders for components - both fabricated and purchased.

If we limit our focus to purchasing, the company's materials planning process may finally result in the following budgets (Hartwell (1973) p. 5):

- the purchasing materials budget, reflecting the production-items which need to be supplied for meeting the organization's manufacturing requirements;

- the MRO-budget (1); the budget for Maintenance, Repairs and Operating Suppliers reflects the materials and services needed to support the entire organization's production schedule and changes;

- the capital equipment- or investment budget to support the production increases or changes in a product and the capital equipment for all other departments' needs;

- the purchasing departmental budget, reflecting the resources needed to realize the objectives of the purchasing organization.

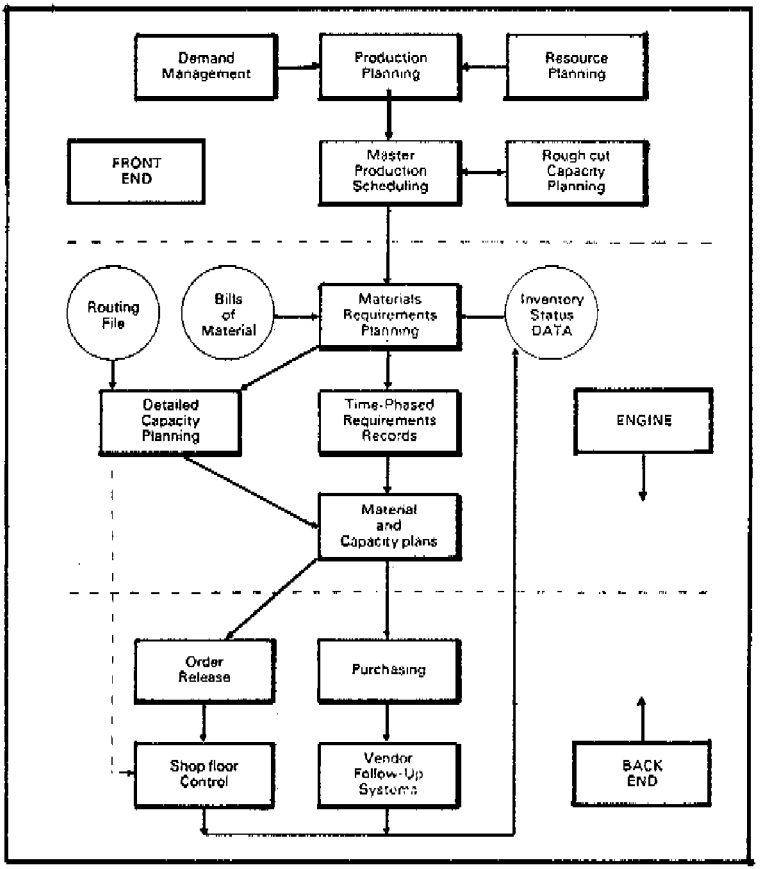

Exhibit 2.2.:
Structure of a Manufacturing Resources Planning System (adapted from Collins, Van Dierdonck and Vollman (1981).

Some companies add a fifth budget in their purchasing planning cycle i.e. a supplier-tooling budget. This budget reflects the investments required in moulds and company owned equipment located at the supplier for manufacturing the products, as specified by the company.

We may conclude that since purchasing planning is a "back-end" activity, that its effectiveness depends to a fair degree on how well the previous stages in the materials planning cycle have been conducted. Problems in the earlier

stages, as well as inaccurate information, untimely information etc. may sincerely distort the effectiveness and efficiency of the purchasing function.

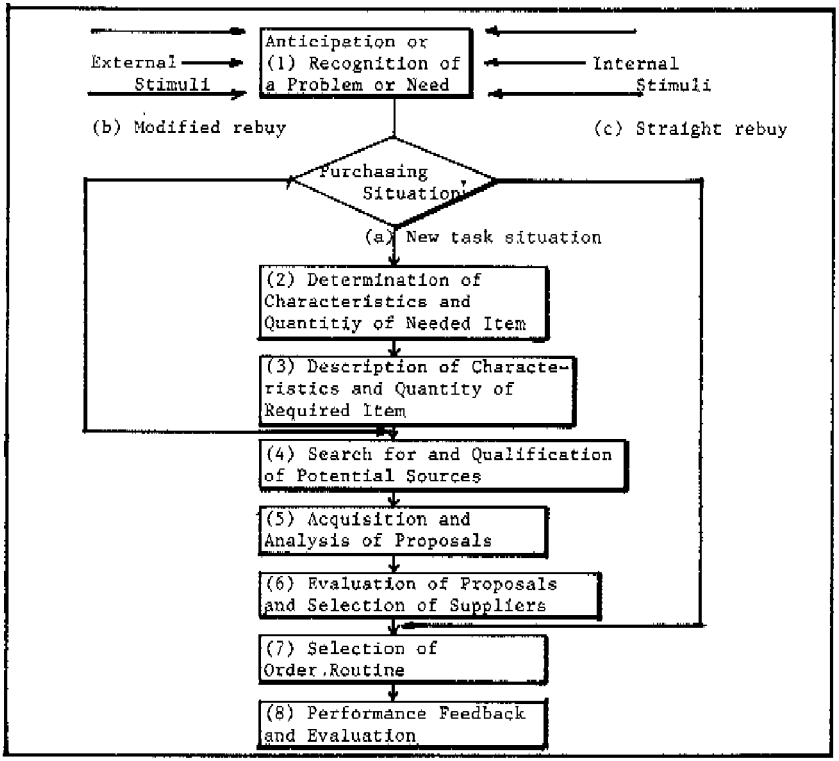

Exhibit 2.3.:
Stages in the industrial purchasing decision making process (adapted from Brand (1972)).

2.4. Purchasing Decisionmaking

Having considered purchasing's place in the materials requirements planning cycle, something has to be said about the purchasing decision-making process. As is shown in Exhibit 2.3., the purchasing decision making process, in its most general sense, can be divided in 8 different stages (2).

stage 1 Anticipation or Recognition of a Problem. Recognition of a problem or (materials) need triggers the purchasing process. Numerous situations can stimulate problem recognition: materials are out of

stock, equipment breaks down, delivered materials are of unsatisfactory quality etc.

At this stage a major consideration is whether the problem can be solved internally (e.g. by making the product ourselves) or that external parties should be sollicited. If this "make-or-buy" consideration leads to a "buy"-decision, the purchasing cycle continues.

stage 2 Determination of the Characteristics and Quantity of the Required Item

Here, it is determined specifically how the problem can be solved. That is: the general material (or service) requirements are being described. Usually by the using departments.

stage 3 Description of the Characteristics and Quantity of the Needed Item

The general requirements should be narrowed down to a detailed and specific description of the required item(s), which can be readily communicated to others. As will be clear, alternatives can be narrowed down to a limited number, especially if supplier names, product names instead of functional specifications are being used.

stage 4 Search for and Qualification of Potential Sources

At this stage an approved vendor's list is being compiled of potential vendors who will be sollicited for bids. Potential sources of supply are being screened and evaluated. In some companies this search process is being limited by an approved vendor's list, which indicates the suppliers that should be sollicited. The intensity of the evaluation procedure varies by organization and the particular product. Furthermore it depends on the company's experience in buying the product and its present relationship with suppliers.

stage 5 Acquisition and Analysis of Proposals

Here, quotations from potential vendors are analyzed and compared. This may be done quickly and superficially (as when buying standard or list-items), however it may also take some time, up to months, as in selecting a vendor for a construction assignment. Usually, it is difficult to differentiate between stage 4 and 5; however, stage 5

emerges as a distinct element of the buying process when the complexity and financial risk of the assignment involved increase.

stage 6 Evaluation of Proposals and Selection of Suppliers

At the previous stage the number of potential suppliers is narrowed down to one or two. Upon the final decision, negotiations may be opened to discuss the terms of condition with the prospective suppliers.

stage 7 Selection of an Order Routine

After the supplier has been chosen, the purchasing order is sent out. This becomes, when accepted by the supplier, a contract between buyer and seller. At this stage, the administrative part of the buying job begins. The buyer should follow the suppliers' progress on the order in great detail, to make sure that nothing happens to prevent delivery on schedule. If orders to certain suppliers are repeated over time, specific procurement routines may be established for this particular item (up to automated ordering systems).

stage 8 Performance Feedback and Evaluation

Finally, reflection on the transaction is necessary. Did the purchased item solve the original problem of the buying organization? This constitutes the final stage in the procurement process. The suppliers products and services are being critically reviewed in order to discuss problems or to improve supplier-performance.

If suppliers have gone through every stage satisfactorily, long term relationships with the customer organizations may result. These relationships may evoluate into complex exchange of information and cooperation; as we will see further in this study suppliers may even become structurally involved in their customers' new product developments.

It should be noted here that this eight stage process is a rather simple representation; actual purchasing processes may be even more complex (see e.g. Håkansson, Johanson and Wootz (1977), Håkansson and Wootz (1979), Johnson (1981), Bonoma (1982) and Håkansson (1982)). Each stage, that has been identified, may consist of several sub-steps. An example is provided in Exhibit 2.4, where stage 7 is divided into its various elements. It is important to recognize that purchasing control can relate to various stages in the purchasing decisionmaking-process.

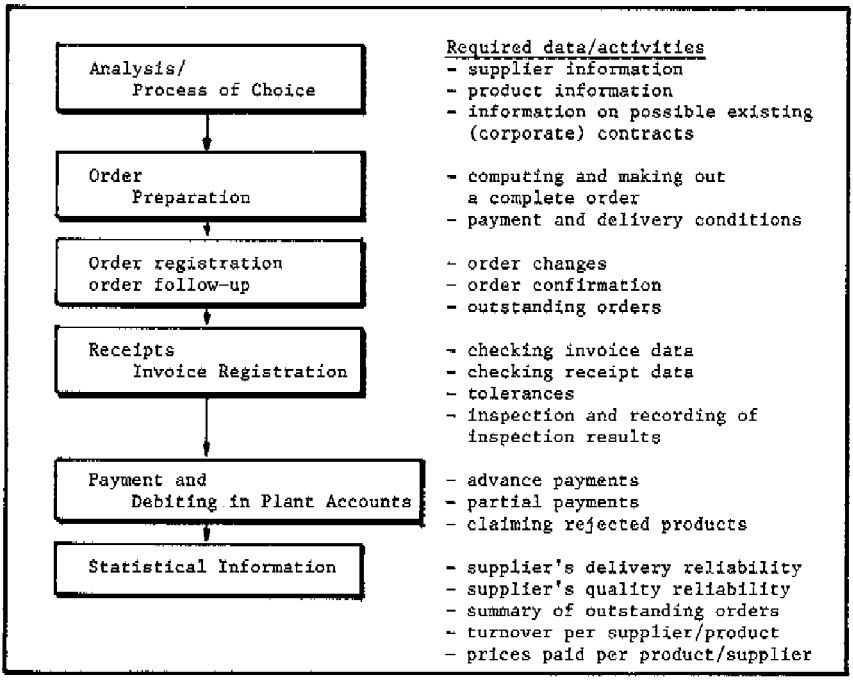

Exhibit 2.4.:
Subsequent steps in "Selection of an Order Routine"

As concluded, Exhibit 2.3. provides a very general picture or model of the buying process which in reality may be totally different. In theory, three types of buying situations have been delineated, (A) new task, (B) modified rebuy, and (C) straight rebuy.

This typology is based on the experience of the buyer and the degree if risk involved in specific buying situations. Depending on the buying situation, the individuals i.e. functional specialists who particular participate in the purchasing decisionmaking process (often referred to as Decision Making Unit (DMU) (3)) will differ. For example: in new task situations, with a relatively high degree of risk, purchasing decisions are made more often by financial and engineering specialists, whereas straight rebuy situations usually are handled by purchasing personnel or materials requirements planning (4).

Each type of buying situation can be related to the eight-stage buying model.

(A) New Task.

The problem or need in the new task buying situation is perceived to be totally different from experiences that have emerged in the past. This situation is characterized by extensive problem solving; members of the Decision Making Unit lack well defined criteria, for making decisions; there is no particular preference towards a particular alternative solution. In providing solutions, many suppliers are considered, since it is not exactly known what to look for. It may relate to situations where, due to a change in technology or product assortment, materials are being bought for the first time.

(B) Modified Rebuy.

This situation occurs when buying a new product from an existing supplier and/or buying an existing product from a new supplier. The decision-making process, that precedes the buying decision can best be described as limited problem solving. This situation is most likely to occur when a company is displeased with a present vendor or product. In searching the supplier market, however, buyers know what to look for.

(C) Straight Rebuy.

This situation refers to repeat-orders, i.e. orders for an identical product from an identical supplier. The amount of risk involved in the transaction is minimal. The decision process underlying the transaction can best be described as routinized response behavior. This situation, in practice, will relate to far most of the buying transactions and/or purchasing orders.

This differentiation of buying situations has become popular especially among industrial marketing-theorists, who found that the members involved in purchasing decision-making varied over the three buying situations (see Exhibit 2.5.). As can be noticed this typology is strictly behavioral; it does not depend on the physical characteristics of the products involved rather it is related to the characteristics of the purchasing decision making process.

For our purposes, it is sufficient to conclude that the kind of control exerted over purchasing activities will unquestionably depend upon the characteristics of the buying situation.

Purchasing Stages	*New Purchase*	*Change in Supplier*	*Repeat Purchase*
Recognition of Need to Purchase	Board, General Management	Buyer	Stock Control System
Determination of Product Characteristics	Technical Personnel	As specified when new purchase	As specified
Description of Product Characteristics	Technical Personnel	As specified	As specified
Search for Suppliers	Technical Personnel	Buyer	Approved suppliers
Assessing Qualifications of Suppliers	Technical Personnel	Technical Personnel and Buyer	Approved suppliers
Acquisition of Proposals	Buyer and Technical Personnel	Buyer	Purchasing Staff
Evaluation of Proposals	Technical Personnel	Buyer	Purchasing Staff
Selection of Supplier	Technical Personnel General Management, Buyer	Buyer	Purchasing Staff
Selection of Order Routine	Buyer	Buyer	Purchasing Staff
Performance Feedback and Evaluation	Technical Personnel and Buyer (informal)	Buyer (informal) System (formal)	Buyer (informal) System (formal)

Exhibit 2.5.:
Members of the Decision Making Unit involved, by type of buying situation (as found by Brand (1972), p. 71).

Finally, the complexity of organizational buying behavior (versus consumer behavior) can be demonstrated by the following characteristics (Webster and Wind (1972), p. 6-7):

- Organizational buying decisions are made more complex by the fact that more people are usually involved in them and different people are likely to play different buying roles.

- Organizational buying decisions often involve major technical complexities relating to the product or service being purchased.

- Organizational buying decisions typically take longer to make than individual (consumer) buying decisions.

- The longer time required for organizational buying decisions means that there are significant time lags between the applications of marketing effort and obtaining a buying response.

- Each buying organization is likely to be significantly different from every other buying organization in the potential market in ways that may require viewing each organization as a separate market segment.

- The organization members participating in the buying function are neither purely "economic men" nor are their motives purely emotional and irrational.

2.5. A classification of Purchased Products

As we have seen, purchasing processes may differ depending on the type of purchasing decision making i.e. the type of buying situation. However, purchasing processes may also differ depending on the characteristics of the products, that are purchased. Usually, these products show a great variety.
Purchased products may range from products, which are purchased off the shelfe, and which involve little money and risk, to very complex products with a high degree of financial risk such as capital items.
Although many authors have proposed a classification for industrial products, most of them are difficult to use. Definitions are generally too elaborate and many classifications do not cover the entire purchasing area.
In some of our post-experience programs, we therefore raised this issue with a request to comment on existing classifications. These discussions with purchasing practitioners resulted in the following definitions

- Raw materials: these are goods which have undergone little or no transformation and which are primarily being used as basis materials in the companys end-products.

- Semi Manufactured Products: goods which have already been processed to some degree and which at a later stage will undergo further physical modification; they physically do become a part of the company's end product.

- Components: goods, which have undergone no physical transformation in the production process but which have been joined in a system with which they have a functional relationship; components may be standard as well as customized items.

- Finished Products: these include all materials which are purchased from outside suppliers and, with minimum value added, are used or sold by the company.

- Maintenance, Repair and Operating Supplies (MRO): these are items, which are necessary for the operations, maintenance and repair of the firm's production and capital facilities.

- External services: this group includes activities, conducted by external suppliers, which are sourced on a subcontracted basis.

- Capital equipment: these are items, which due to their high financial value, are depreciated over their economical or technical life-cycle and which therefore annually are stated on the balance-sheet of the company.

As can be seen from this classification, it is based primarily on the physical characteristics of the products involved, as well as their functional destination. Some observations, however, should be made. To some degree it is similar to the classification, which Marrian (1972) has proposed. However, it differs to the degree that:

- with regard to capital equipment, no further distinction is made between major equipment and minor equipment (each of which are further subdivided by Marrian into three subcategories).
- finished products (often an important part of the purchased product assortment) are designated here as a separate category; Marrian includes these in her definition of fabricated materials (which we have referred to as semi-manufactured products).
- MRO-supplies are not further subdivided into packaging materials, operating supplies and spares and replacements (as Marrian suggests).

- external services are not further subdivided; Marrian differentiates services in advisory and consultative services.

With regard to the ideas of Corey (1978) our classification differs in that:

- Corey differentiates explicitly between standard product parts and custom-product parts; the first category includes off-the-shelfe components, whereas the latter refers to components, made to user specifications (5); when necessary we will follow this subdivision in our study;
- Corey identifies as a sub-category internally sourced products; this author was inspired by the practice of some large companies, which have assigned managers especially to negotiate with internal sources of supply; since our classification is based on the physical characteristics of the products bought, we do not want to include these products as a separate category.

Finally we want to note that our classification as other classifications, primarily serves as a term of reference or framework for our study. Experience has shown that some product categories (such as energy and packaging) are sometimes difficult to define in our classification. However, it is felt that it provides a clear overview of the diversity of products that can make up the purchased product assortment.

Notes to chapter two

1. MRO stands for Maintenance, Repair and Operating Supplies (see for a further explanation section 2.5..

2. These stages have first been suggested by Robinson, Faris and Wind (1967); later additions and refinements were made by Brand (1972), and Stevens and Grant (1975).

3. Decision Making Unit is referred to by theorists as "those individuals and groups who participate in the purchasing decision-making process, who share some common goals and risks arising from the decision" (Webster and Wind (1972), p. 6).

4. Actually, Corey further differentiates custom-component parts between buyer specified items and supplier specified items.

CHAPTER THREE: MANAGEMENT CONTROL THEORY: A STATE OF THE ART

3.1. Introduction

Having described the purchasing process in the previous chapter, this chapter focuses on the role and importance of purchasing control in the purchasing management process. Although in management literature more perspectives on control exist, we have chosen to discuss this issue from a managerial point of view. More particularly the purpose of this Chapter is;

- to describe the role and importance of control in the general management process;
- to discuss the characteristics and nature of management control in organizations;
- to define important concepts such as organizational performance, effectiveness and efficiency and their relationship to control-processes;
- to describe the various levels of management control.

Measuring organizational performance can, as we will see, be considered from two different viewpoints i.e. from a scientific viewpoint and a managerial point of view. The benefits and limitations of both will be discussed. Finally, the Chapter is concluded with an overview of different types of measures, which are often used in practice to evaluate organizational activity.

3.2. Control in The Management Process

There are probably as many definitions of what management is and does, as there are writers in the field. Overseeing literature, management as a concept may be considered from different perspectives. It may relate, among others, to:

- a group of managers ("The management of company 2 has decided that ...")
- a business function (".....managing resources to realize the goals and objectives of the company .....")
- a body of knowledge ("Management science .....")

- a philosophy towards leading organizations ("Management by Objectives ....");
- a systematic process consisting of several consecutive steps ("... planning, organizing, controlling .....").

Depending on the perspective of the author, definitions of management will differ. For our purposes we will adhere to a general definition, which has been given by McFarland (1978). This author considers management as (p. 650):

"an integrating process by which authorized individuals create, maintain and operate an organization in the selection and accomplishment of its objectives".

Management is considered here from a process-point-of-view, which consists of several (managerial) functions such as directing, resourcing, activating, representing, coordinating, communicating, motivating and decision-making. In a more comprehensive model, five key areas of management acitivity are identified (1):

- Planning. Planning involves selecting from alternative missions and objectives the strategies, policies, procedures and programs for achieving the mission and objectives for the company as well as for its functional departments. Stated otherwise: planning is deciding in advance what (you think is possible) to do, how to do it, when to do it and who is to do it.

- Organizing. This involves the clustering of activities necessary to attain the planned mission and objectives. Furthermore, it includes assigning the responsibility for each cluster to managerial positions coordinated in the organization structure.

- Staffing. Staffing entails manning positions provided for in the organization structure. It includes evaluating managerial jobs as a means of determining status and compensation, selecting people to fill (managerial) positions, appraising personnel and giving them opportunities for development through desirable training.

- Directing and leading. This function encompasses the important interpersonal aspects of managing. Included in this function are such major subjects as motivation, leadership and communication.

- Controlling. This function may be regarded as the measuring, evaluating and correcting of activities of subordinates in order to make the accomplishment of intended objectives as certain as possible.
  Thus:
  - it involves measurement of actual performance as compared with goals, plans, standards and,
  - where negative deviations exist, it calls out the need for corrective action.

Although this conceptual model is frequently mentioned in literature, some observations can be made:

- it represents a rather mechanistic approach towards the management- process in that it assumes that this can be divided in several distinct steps; furthermore it assumes that management processes are rather systematic and rational in nature; as research has shown (see Mintzberg (1973) (1981)) management processes to a fair degree are irrational and iterative, and not as systematic as often is assumed; it must be noted that other perspectives on management processes are possible (2).
- it represents, as Botter (1981) has argued, a "top-down"-approach rather than a "bottom-up" approach; when organizing and assigning tasks and responsibilities to functional units within the company, this should be done in a way that costs are minimized; other criteria are possible, however;
- the several steps are difficult to differentiate from each other; there are no strict boundaries between the activities (appraising personnel, for example, may be considered to belong to staffing as well as to controlling).

We may conclude that the conceptual model, as presented here, reflects an idealized state of management processes, rather than real business practice. For our purposes it is sufficient to recognize that "Control" is an essential and integral part of managerial activity, which is difficult to isolate from the other managerial functions.

3.3. The Nature of Control in Organizations

A control system is a system whose purpose is to reach or to maintain a desired state or condition. Any control system essentially has at least these four elements (Anthony and Dearden (1976) p. 3):

- a measuring device, which detects what is happening in the parameter being controlled;

- a device for assessing the significance of what is happening, usually by comparing information on what is actually happening, with some standard or expectation of what should be happening;

- a device for altering behavior if the need for doing so is indicated;

- a means for communicating information among these devices.

These elements are to some extent similar to those of cybernetic control systems. As Botter (1981) (p. 61) has noted these models, which are frequently found in technical systems, to some extent can be used for controlling and managing organizations. However, in doing so, several problems may arise (Anthony and Dearden (1976)):

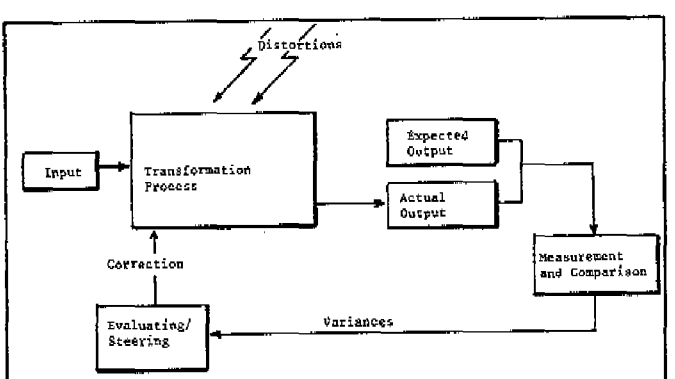

Exhibit 3.1.: Essentials of a Control System (adapted from Botter (1981))

- it is difficult to separate planning from control, since standards which are used in planning often result from past performance; therefore, planning and control cannot be considered independently;

- control systems in organizations do not operate automatically; deviations between planned and actual performance are established and assessed by human activity;

- the connection between the observed need for action and the behavior required to obtain the desired action is by no means as clear cut as it is in the case of simple cybernetic control systems;

- control in organizations requires coordination; an organization consists of many parts and control systems must ensure that the work of these parts is in harmony with one another (and oriented towards a common goal);

- much control in organizations is self-control; that is, that managers act to a large extent on the basis of their own judgment, deciding what appropriate actions they should take.

To these problems another problem can be added, which is that management control theory presupposes that organizational performance in effect can be measured. If management is able to express its expectations of the organization in clearly expressed targets, it is assumed that organizational behavior can be controlled and its performance assessed. However, it can be questioned if all variables that make up the ultimate performance of an organization can be expressed in such a way. To quote an example: one of the variables essential for the success of an organization is quality and motivation of its personnel. One of the problems in this area, however, is how performance of human resources can be related to organizational performance. Do organizations, which have better motivated employees, perform better than organizations where dedication and motivation among employees are low? How is motivation and quality of personnel to be measured? Those are questions, which are dealt with in a number of books and articles and to which no definite answer has been found. For this reason establishing targets and standards in this area is an extremely difficult and delicate matter.

The point is that organizational performance is influenced by a great many variables. Some of these variables can be expressed in quantitative terms (such as volume of materials needed, number of labour hours needed, capacity needed). However, many of these variables (such as quality of human resources, reliability of vendors, innovativeness, etc.) cannot be exactly defined and therefore cannot be exactly measured and evaluated.

Summarizing this paragraph it can be said that control in organizations requires a variety of functions: planning what the organization should do, coordinating the activities of the several parts of the organization, communicating information, measuring and evaluating information and deciding what, action should be taken, influencing people and excercising power, to change their behavior and processing information that is used in other functions. Definition of organizational performance has been highlighted as one of the major problems in contempory management control theory. Therefore this subject is discussed in more detail in the next paragraph.

3.4. Organizational performance, effectiveness and efficiency

Reference has been made to organizational effectiveness and efficiency, several times in the previous paragraph. There are probably no other concepts in management literature causing so much confusion. This has been recognized by Simon (1966), who identified several interpretations of both concepts in literature, and more recently by Steers (1975) and In 't Veld (1981). Since a clear definition of both concepts is necessary for a good understanding of this study, these are discussed here in more detail.
Attention will be also given to how effectiveness and efficiency relate to organizational performance. In our explanation we will adhere closely to the ideas of In 't Veld ((1976), (1981)).

Essencially every activity pattern in any organization can be considered as a series of single actions, which are simultaneously executed.

It is assumed that the only reason why any action is undertaken is to be able to reach a previously (more or less premeditated) established goal. Every activity is thus implicitly, considered to be goal-oriented. To be able to direct and govern human activity in organizations it is from a rational point of view necessary that the objectives of any organization are made explicit and that they are stated in a clear and unambiguous way. Furthermore it is important that the objectives are communicated to all participants.

To be able to attain its goals an organization needs to employ several resources. These resources may have a material character such as raw materials, components, capital, equipment, but they may also have an immaterial character such as manpower, know-how, experience, management ability. Furthermore they may

be expressed in quantitative terms, such as amount of money, costs, volume, as well as in non-quantitative terms. Each resource will have its own costs (3). Usually it will be possible to choose from several courses of action in order to reach the goal.
The optimal course of action, therefore, always assumes a decision process in which several courses of action are evaluated. In this process different parties may express different opinions about the selection-criteria to be used and about the ultimate choice. However, the most desirable course of action will meet at least these two conditions:

- it will enable the decision-maker to satisfy his goal; by choosing this course of action it is expected that there will be no deviation between the expected outcome of the decision-maker and the actual outcome; this prerequisite is referred to as the condition of effectiveness;

- the goal is attained with minimum effort and costs; of all courses of action available to reach the goal, the most favourable one is the one with the lowest sacrifice; this prerequisite is referred to as the condition of efficiency.

Both terms, effectiveness and efficiency, can now be defined more precisely. Effectiveness is defined as the extent to which, by choosing a certain course of action, a previously established goal or standard can be met. It is important to recognize that effectiveness essentially refers to the relationship between actual (R_a) and planned (R_p)performance of any human activity (R_a/R_p). A selected course of action is either effective or not: a goal is reached or not. However, the goal can be expressed in terms of aspiration levels; the course of action that realizes a higher level may then be considered as more effective than another.
Efficiency is defined as the relationship between the planned (C_p) and the actual sacrifices (C_a)made in order to be able to realize a goal previously agreed upon. What is important to recognize here is that efficiency pertains to the resources/means selected. Essentially it refers to the relationship between two kinds of costs: (C_a/C_p).
After these definitions both concepts can now be discussed in more detail.

Only those activities with an effectiveness greater than one are relevant, since other alternatives will not enable us to achieve our goals. If no alternatives

with an effectiveness greater than one exist under certain circumstances, then we need to consider two possibilities:

- we will have to search for other possible alternatives which have not yet been investigated;

- we will have to accept that there is no alternative available which fully satisfies our goals; as a consequence we will need to lower our aspiration-levels and goals.

Efficiency has been earlier defined as the relationship between two kinds of cost (a/p). For efficiency purposes that course of action should be preferred which, after examination of all available alternatives, offers goal-attainment at the lowest costs. These costs, are taken as norm for evaluation of the efficiency of other alternatives. Efficiency, therefore, can be restated as:

$$\text{Efficiency} = \frac{C_{actual}}{C_{standard}}$$

Our prerequisites for choosing the most desirable course of action in a specific situation can now be restated as follows: that course of action is preferred which has:

- an actual effectiveness of 100% or higher
- an actual efficiency of 100% or higher

In a specific course of action a lower efficiency could be chosen for in order to obtain a higher effectiveness. An example could be: making extra working-hours in order to get goods delivered earlier to the customer. The reverse is also possible: lowering the organization's aspiration levels in order to save money. (e.g. going from a 100% service-level to an 90% service-level in order to save inventory-costs, handling costs, etc.).

As we can see, effectiveness and efficiency, as concepts, have primarily theoretical value; in reality they are interdependent and difficult to separate.

Some authors add a third concept to this discussion, that is, productivity. Productivity is referred to as the relationship between results (output) and

costs (inputs) (R/C). In allocating scarce resources, productivity is an important criterion: only that activity is selected which satisfies our expected results against minimal costs (effectiveness greater than one).
In the evaluation stage, considering that our targets have been achieved, only costs are of major concern. Productivity, therefore, replaces efficiency, which is a major reason why these concepts are often confused in practice (In 't Veld (1976), p. 12).

Productivity measures may be used in situations, where a direct relationship exists between input- and output-factors. Not surprisingly, these measures appeared to be used most in technical control-systems. In manufacturing usually many productivity-ratio's are used, which relate e.g. direct labour to various output-variables (volume, production, value, waste).
However, when a direct relationship between input and output does not exist (such as in staff-organizations) productivity measures are less useful. For instance, relating worker-hours to the number of purchasing orders issued is useless, since purchasing administrative leadtime will depend on many external factors (e.g. product complexity, and commercial risk involved). A direct relationship between worker-hours and number of purchase orders is therefore difficult to establish. Consequently, a measure, which tries to force a relationship between these two variables, is difficult to interpret.

This discussion enables us to define the concept of organizational performance. Although often used in literature, a concise definition could not be found (4). In our view organizational performance can be defined as: "the resultant of organizational effectiveness and efficiency, or put in another way, as the extent to which an organization is able to reach its predetermined goals at the sacrifice of a minimum of its resources".

We are aware that this definition is in no way operational; it serves as a term of reference rather than as a way in which organizational behavior can be looked at. It presupposes that any organization, in order to be effective, should have formulated its goals. This implies that effectiveness as concept is situation-specific i.e. its contents (and proper definition) depend on the characteristics of the individual organization. Recognition of this fact helps to understand why theorists have come up with so many different definitions. Furthermore, acceptance of this idea helps to explain that the measures, used to evaluate organizational effectiveness, are also situation-specific. Thus it can be

concluded that there is no universal yardstick to measure organizational performance (5).

Our definition of organizational performance presupposes a rather rational decision-making process for resource-allocation. As has been demonstrated by Mintzberg (1976), however, decision-making in organizations is not rational, but a highly political process in which means and ends are difficult to distinguish or cannot be distinguished.
In our opinion, means and ends can only be distinguished analytically (or theoretically) except in some extreme situations (e.g. static models of organizations, situations where extreme power is exerted and goals are imposed on subordinates). Finally, whether something is considered as a goal or not, may depend on the location in the organization's hierachy. A production schedule may be a goal for the production manager; however, it may be considered by the sales manager as a means of keeping customers happy, and to make a reasonable profit. Meanwhile it will be evident from this discussion that organizational performance - in theory - can only be assessed, if a number of conditions are being met. More specifically it is required that:

- the goal and objectives of the organization are determined and that they are agreed upon and well understood by all participants; this will often require a formulation in quantitative terms (sales, contribution- margin, market-share, net profit-after-taxes etc);
- specific programmes indicating the resources necessary to attain the plans of the organization, are designed; the resources needed should also be expressed in measurable terms (capacity needed, production- materials, investments, man-hours needed);
- actual results are monitored continuously;
- actual costs are monitored continuously;
- actual and expected results are compared and evaluated;
- actual and expected costs are periodically compared and evaluated;
- evaluation-feedback is continuously translated into future plans and programs.

Although this list cannot be considered as exhaustive, it can be concluded that if management fails to satisfy one of these conditions, organizational activity cannot be adequately measured and controlled.

At the end of this paragraph we want to observe that organizational performance in fact is multi-dimensional in nature. Results as well as resources can be measured and evaluated from various perspectives.
Results, for example, can be measured and evaluated from the perspective of turnover, added value, customer service, quality, etc. They may be expressed in terms of dollars, volume, tonnage per mile etc.
Resources may include labour, capital, soil, materials, space, equipment, information and energy, each of which may be measured to assess how well the organization had done. Relating "all" resources to "all" results is a rather theoretical issue, since both are difficult to express in common terms. Where this is done (such as in regular reports on labour-productivity in industry by the Central Bureau of Statistics), the information can only be used at a rather high level of aggregation. Such information is often used by top-management for purposes of strategic planning. Such indicators are less useful for controlling the organization's operational processes, which require much more detailed information.
Therefore, we agree with Botter (1983), that performance measurement at the operational level requires detailed information of various aspects of the company's processes. The multi-dimensional character of performance measurement within organizations is shown in Exhibit 3.2. Result- or performance factors are turnover, volume, quality, and customer service. Resource- or cost-factors are labour, capital,materials and miscellaneous factors (which include e.g. energy).

3.5. Operational control

Planning and control procedures may relate to different levels in the organization. In this respect a distinction is often made between the strategic, tactical and operational levels. Ansoff (1968) refers to three classes of decisions, which are made by organizations,

- Strategic decisions. These are primarily concerned with external problems of the firm and more specifically with the selection of the product mix, which the firm will produce and the markets to which it will sell. This level refers to the problem of deciding what business the firm is in and what kinds of businesses it will seek to enter. The consequences of these decisions extend over a long period (over 5 years).

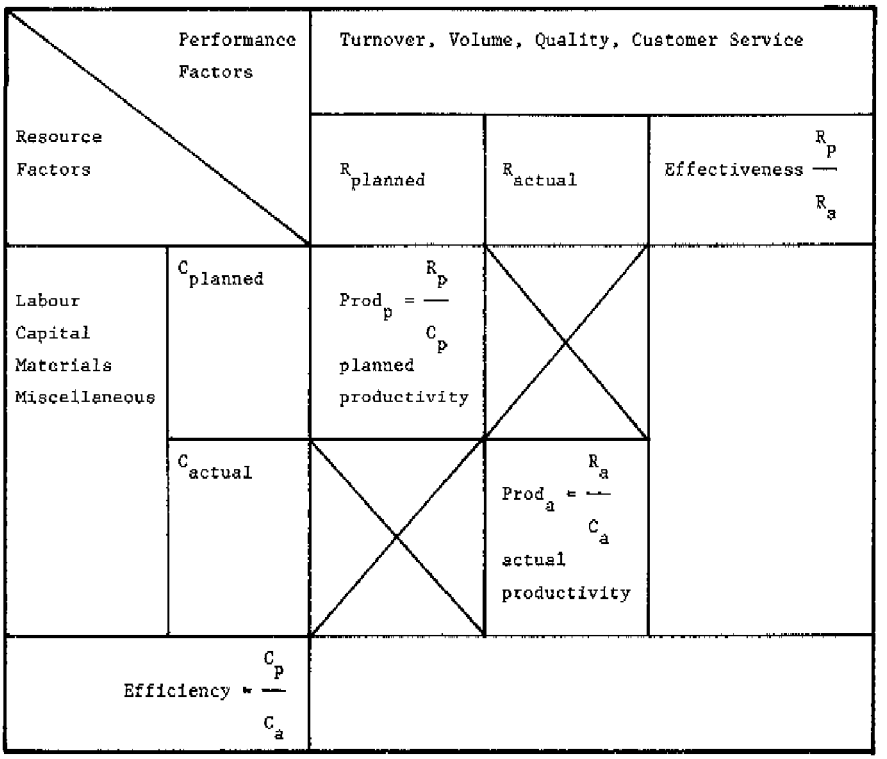

Exhibit 3.2.: Effectiveness, Efficiency and Productivity Measures Interrelated (adapted from Botter and Torremans (1983))

- Administrative decisions. These are concerned with structuring the firm's resources in a way which creates a maximum performance potential. One part of the administrative problem is concerned with organization, structuring of authority and responsibility, relationships, workflows, etc. The other part is concerned with the acquisiton and development of resources.

- Operating decisions. These decisions are concerned with maximizing the efficiency of the firm's resource conversion process, or stated otherwise, with maximizing the profitability of current operations.

From this classification the idea has grown that measures and techniques for purposes of planning and control should correspond with the level of

organizational decisionmaking. Techniques aimed at controlling operations differ substantially from techniques for strategic planning. Adhering to the ideas of Ansoff, Anthony and Dearden (1976, p. 7) differentiate between strategic planning, management control and operational control. Since this study primarily deals with operational control, this subject is discussed in more detail.

Operational control is defined as the process of ensuring that specific tasks are carried out effectively and efficiently.
The focus of operational control is on the execution of individual tasks or transactions; scheduling and controlling individual jobs through a shop, contrasted with measuring the performance of the shop as a whole.
Management control is defined as the process by which managers ensure, given the goals of the organization, that resources are obtained and used effectively and efficiently in the accomplishment of the organization's goals.

Compared with management control systems operational control systems differ in the following respects:

- an operational control system is a more rational system: that is, the action to be taken is decided by a set of logical rules; in management control, psychological considerations are dominant; the management control system at most assists those who take action; it does not result, directly or by itself, in action without human intervention;

- the management control system is ordinarily built around a financial structure, whereas operational control data are often non-monetary;

- operational control uses statistical or exact data, whereas management control needs only approximations;

- in an operational control system data often relates to individual events, whereas data in management control systems often is more retrospective and summaries many separate events.

Anthony and Dearden describe even more differences, but for the sake of brevity these are not mentioned here. A summary of the most important differences between operational and management control can be found in Exhibit 3.3.

CHARACTERISTICS	MANAGEMENT CONTROL	OPERATIONAL CONTROL
Focus of activity	Whole operation	Single task or transaction
Judgment	Relatively much; subjective decisions	Relatively little; reliance on rules
Nature of structure	Psychological	Rational
Nature of information	Integrated; financial data throughout; approximations acceptable; future and historical	Tailor-made to the operation; often non-financial; precise; often in real time
Persons primarily involved	Management	Supervisors
Mental activity	Administrative persuasive	Follow directions (or none)
Source discipline	Social psychology	Economics; physical sciences
Time horizon	Weeks, months, years	Day-to-day
Type of costs	Discretionary	Engineered

Exhibit 3.3.:

Some distinctions between management control and operational control (Anthony and Dearden (1976) p. 18).

Having described organizational performance, effectiveness and efficiency and having discussed the several control levels in organizations, these concepts can now be related to each other. An attempt has been made in Exhibit 3.4. From this Exhibit it can be seen that strategic planning and control deal primarily with stating and formulating the goals and objectives of organization i.e. primarily pertain to organizational effectiveness. Whereas operational control is directed primarily at improving the organization's resources i.e. its efficiency.

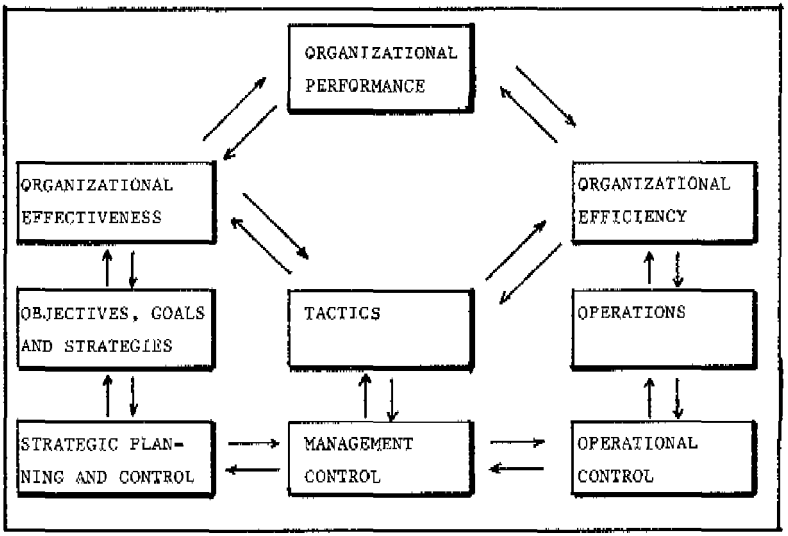

Exhibit 3.4.: .Relationships between organizational performance, effectiveness and efficiency and the three managerial control levels of the organization

3.6. Measurement for management decisions

What measures or standards should be used to evaluate organizational activities? How and by whom should they be established? What kinds of performance standards are feasible and how should deviations from standards and plans be assessed? These questions are discussed in this paragraph.

With regard to measurement procedures and methods a distinction should be made between two different perspectives. The first is referred to as the method of scientific measurement, whereas the second is called measurement for managerial purposes. Scientific measurement is described as the process of assigning numerals to objects or events according to some rule, (De Leeuw (1981), Mason and Swanson (1981)). The properties of the objects are represented by the numbers assigned and the numbers themselves are termed measures. In scientific measurement the scientist primarily wants to describe, explain or predict the features and characteristics of the empirical world. So his test of a measure essentially lies in the question: "How well does this measure reflect the aspects of nature I wish to describe, explain or predict" (Mason and Swanson

(1981)). From this perspective emphasis is placed on the semantic importance of the measure per se, rather than on the uses to which the sign will ultimately be put: a good measure in this perspective is an accurate measure.

In managerial measurement much more attention is given to the user of information. Measurement in this perspective is much more decision- oriented and pragmatic. It becomes the assignment of numerals to objects or events in such a way that it aids the manager in pursuing the social system's purpose. It requires an understanding of purpose as well as the social, psychological and technical aspects of measurement as they relate to achieving that purpose. Achieving the objectives of the organization is prevalent. Measurement should primarily provide management with information, that enables it to direct the organization towards its goals. The measurement process in this perspective primarily serves the following purposes (Mason and Swanson (1981)):

- directing managerial activity towards those questions which deserve most attention (attention directing):
- providing management with alternative solutions to existing problems (problem solving):
- keeping management informed about the way the organization operates (scorecard keeping).

As has been argued scientific measurement differs from managerial measurement in that it largely ignores the user of the information. Therefore, the former perspective is felt here to be less appropriate as a monitor for organizational behavior.

Every managerial measurement should be designed recognizing the needs and wants of the user. It should be fitted to the goals and objectives of the organizations and their individual members (i.e. its effectiveness) and to the processes (i.e. its efficiency) by which participants assimilate and act on measurement data.

A similar view on designing measurement systems in organizations is expressed by Anthony and Dearden (1976). In their view a management information system should be designed so that the decisions, that it leads people to take in accordance with their perceived self-interest, are decisions that are also in the best interests of the organization (p. 47). It should primarily be able to support organizational decision-making.

Management information systems (MIS) in this view should never be questioned as to lack of accuracy. As these authors say (p. 97): "It is illogical to criticize

a MIS, or any measurement system, on the grounds that it is not precise; the question is whether it is good enough for the intended purpose. In designing a MIS a trade-off should be made between the precision and the timeliness of the information".

Measurement in the view of Anthony and Dearden, refers to evaluating actual performance against previously set plans. The results of these measurements need to be communicated periodically to the responsible manager. This information is usually then evaluated. The evaluation process starts with a comparison of reported actual performance with planned performance. Based on this comparison, and on other information which may help to explain why actual performance has differed from planned performance, the manager makes a judgment on whether or not the performance was satisfactory. This process can be seen in Exhibit 3.5.

Thus measurement must be considered as an integral part of information processing in organizations. Analyzing how information within organizations is being processed and used, is important for the reason that it plays an important role in directing and steering the organization. The quality of certain kinds of measurement, therefore, refers directly to the extent to which it is used to improve the organization in decision-making. In deciding what should be measured, the decision-maker is the ultimate criterion: measures should reflect his needs and wants by providing information which would enable him to make better decisions. Therefore these measures should be congruent with his perceived goals and objectives: a condition, which, as we will see later, is not often met in practice.

3.7. Criterion development

In measuring organizational performance many measures have been developed for a variety of organizational activities and organizations. However, most of the reported measures are of a quantitative character. Since management is generally concerned with economic or cost-related outcomes of the organization, these quantitive measures of performance outcomes mostly relate to profits, costs and return of investment. Such measures are usually used as indicators of an organization's performance (6). However, they are generally inadequate for measuring a single job's effectiveness for several reasons.

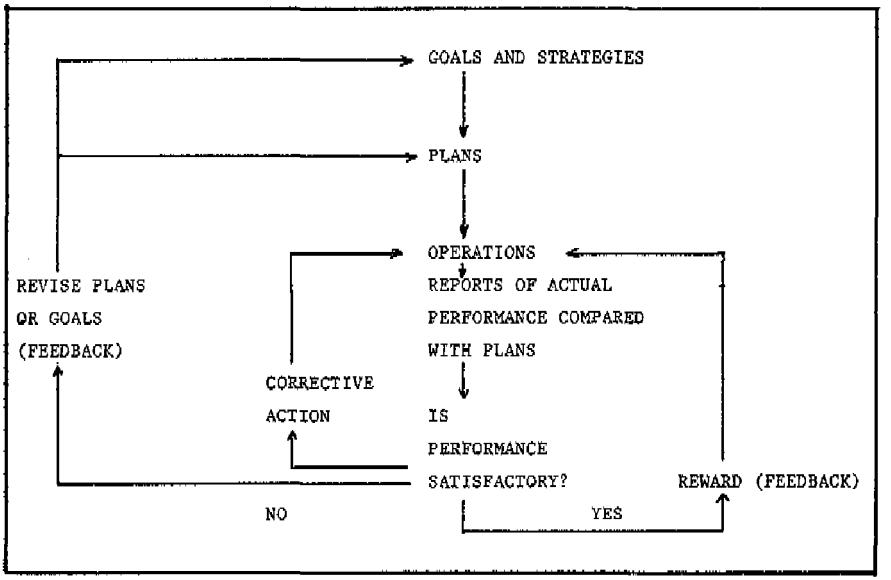

Exhibit 3.5.: The Control Process
(adapted from Anthony and Dearden (1976), p. 102).

1. Cost related measures are almost always deficient in that they often omit important factors for which a person should be held responsible.

In most cases emphasis is placed primarily on tangible results that are easy to measure. Consequently many employees feel that there is an overemphasis on quantitative goals because they are not measured on, nor do they receive credit for important aspects of their jobs, which cannot be spelled out in quantitiative terms. To give an example: the success of an industrial salesman may to a large degree depends on his ability to develop a favourable attitude from the customer towards him and/or his company. However, developing this attitude may take some time. If this salesman is evaluated only in terms of sales conducted this may endanger the long-term relationship between the selling and the buying company. Under such circumstances the seller will be eager to push through a buying decision from the customer without giving him sufficient time to consider his offer, which may endanger the relationship with the customer.

2. Cost-related measures are difficult to obtain on employees in many jobs. These measures can be obtained only when the employee produces a distinguishable output i.e. an output, which can be clearly defined. Generally this will be easier for blue-collar than for white- collar or managerial employees.

3. Cost-related measures often take into account measures over which the employee cannot exert control (e.g. tools and equipment, materials and supplies, time available etc.).
   Employee performance is often affected by the performance of others. If they do poorly, the employee does poorly. Therefore quantitative measures are usually better applicable to the work group as a whole than to the individual as such. For instance: when evaluating industrial buyers on price performance (i.e. on prices paid for purchased materials) what standards should be used and how should they be set? Price performance in this case may be strongly influenced by environmental factors (such as changes in currency-exchange rates, economic situation, degree of capacity utilization etc.) over which the individual buyer cannot exert any influence. Standards should reflect these factors and they should be recognized in interpreting prices actually paid by the company.

4. The sole use of quantitative measures can encourage a result-at-all- costs mentality than can run counter to the overall productivity of the organization. The selected measures should be in line with the organization's goals and objectives.
   This condition is not always met in practice. Blau (1955) reports an example of a public employment agency, in which the staff was appraised by the number of interviews conducted. In this way each staff-member was motivated to complete as many interviews as he could, but not to spend time in locating jobs for the clients. The agency's goal of placing clients in jobs was not given primary consideration, because the measurement device applied to only one aspect of the job. Blau reports another case in a federal law enforcement agency which investigated business establishments. Here he found that work schedules were distorted by the imposition of a quota of eight cases per month for each investigator. Towards the end of the month an investigator who found himself short of eight cases, would pick easy, fast cases to finish that month and save the lengthier cases until the following month. Elsewhere in management literature this tendency to use easy jobs as

fillers towards the end of a period in order to meet a quota was found (Argyris (1952), Jasinsky (1955).

5. Economic measures or performance outcomes by themselves do not inform employees what they need to do to maintain or increase productivity. Telling a salesman that he has not met his sales-goals this month will not come as a surprise to him. He will already have this information. What he needs to know is exactly what he should do to improve his performance.
   Another aspect, which is not reflected in quantitative measures, is why the actual outcome differed from the intended one.
   It could be that the salesman's goals were not adequately set or that an unexpected external factor beyond his control had a negative influence on the company's product, he was meant to sell (e.g. a negative message in a newspaper that the product concerned was considered detrimental for the environment).

For these reasons quantitative, cost-related measures should be treated with care, when evaluating organizational performance. Since they seldom reflect all the important factors for a person's job, it will be difficult to base your judgment solely upon them. When using quantitative measures, these should be accompanied with background information on how they were derived and on their limitations. More specifically the user should be aware of the factors not measured by these measures.

In performance measurement, deciding what kind of criteria to use is of the utmost importance. For every criterion there are some disadvantages, which may contort final judgment if not thoroughly understood. Generally a distinction is made between three kinds of criteria i.e. single, multiple and composite criteria. These are discussed below.

Single criteria

Single criteria occur when only quantity is measured and observed, such as total output or profit. Ridgway (1956) gives many examples of cases where business or departmental activities were being evaluated against only a single criterion. Profitability has often been considered as the ultimate measure of organizational effectiveness. However, overemphasizing its importance may easily lead to a reduction in experimental work (research and development) and may de-emphasize the importance of product quality. For this reason the usefulness of univariate

measures for evaluating organizational effectiveness has been questioned on several grounds.

Multiple criteria

To overcome some of the disadvantages of single measures, multiple criteria can be used. For example, buyers may be evaluated by management simultaneously on savings, amount of inflation accepted, delivery reliability, negotiation-abilities, etc.

The use of multiple criteria assumes that the individual will commit his or the organization's efforts and resources in greater measure to those acitivities, which promise to contribute most to overall performance (Ridgway (1956) p. 245). This assumption, however, is rather theoretical for the following reasons.

- in a real world setting, criteria may be conflicting; a target to reduce inventories may be offset by the savings to be achieved by buying in greater volumes; if an individual buyer is assessed both on inventory- levels and savings achieved through quantity discounts, confusion may arise.

- contributions to the criteria, which need to be considered, may be difficult to quantify and/or to evaluate; the individual buyer is forced to rely upon his judgment as to whether increased effort on one criterion improves overall performance, or whether there may be a reduction in performance on some other criterion, which will outweigh the increase in the first.

- some criteria may be short-term oriented, whereas others are more long- term oriented; agressive negotiating may lead to short-term pricereductions, but it may affect quality adversely in the long term (since it is highly probable, that suppliers are going to "cut corners" with regard to specifications).

Priorities among the criteria used should be indicated and communicated: otherwise, scattered and incoherent activities will probably result.

Composite criteria

An explicit weighting system could overcome some of the limitations, as discussed for multiple criteria. Such a system would enable combining the various criteria into a composite score for overall measurement. However, some of the criteria, which are considered to be good indicators for good

performance, may still be conflicting (such as low inventory levels versus quantity discounts). Moreover, the units of measurement among criteria may be different, so that a composite index is difficult to calculate. Finally, assigning weights to the different criteria, introduces a subjective element into the evaluation process; individuals may differ in opinion about the importance of each criterion.

It can be concluded that quantitative performance measures should be treated very carefully, since they may easily lead to undesirable consequences for overall organization performance. Even where performance measures are instituted purely for purposes of information they are probably interpreted as definitions of the important aspects of that job or activity and hence have important implications for the motivation of behavior.

3.8. Conclusions

The concepts found in management-literature have important implications for purchasing performance control-activities. A number of conclusions can be made. The first is that planning and budgetting need to precede control. Planning provides the organization with tasks and objectives, which in essence are the standards against which human activities are evaluated. Without effective planning there can be no effective control.

When evaluating organizational activity a distinction should be made between effectiveness and efficiency. Since organizational performance can be considered as the result of both, improvement may be achieved by increasing effectiveness or efficiency, or both simultaneously. Therefore any organization should control its effectiveness as well as its internal efficiency. However, as has been argued, measuring organizational performance is situation specific; there is no universal way to assess organizational behavior. Performance evaluation is not an objective in itself. It should be done in order to improve organizational decisionmaking. The questions "what should be measured and how should it be done?" should be answered primarily by the decision-maker. Control-systems should be user-oriented. The question is not whether a given measure is accurate or not, but whether it is good enough for the intended purpose. This implies that when designing a management-control system for any functional business area, the user/decisionmaker should be actively involved.

Notes to Chapter Three

1. See among others Mackenzie (1969) and Koontz (1978); it must be noted here that the process perspective on management initially has been advocated by Fayol in 1916: other authors, actually, have later refined his original ideas.

2. Other perspectives on management as a process are incorporated in contingency theories, system hierarchies (Boulding), cybernetics etc.

3. Costs are here referred to in their broadest sense; they comprise monetary costs as well as non-monetary sacrifices.

4. See for example Steers (1975), and Child (1972, 1977); in The Netherlands this issue has been commented on by Kempen (1979).

5. As we will see this conclusion has important implications for measuring purchasing departmental performance.

6. This particularly applies to organizations, which are profit-oriented.

CHAPTER FOUR:
PURCHASING PERFORMANCE MEASUREMENT AND EVALUATION: A LITERATURE REVIEW

4.1. Introduction

Since 1922, when the first book on purchasing management, discussing performance measurement and evaluation appeared, much has been written on this subject and it is interesting to follow the way of thinking through history. Starting from a simple and narrow view on the subject, it devoloped into a more professional and sophisticated orientation.

In our overview we have tried to comprise the major authors, who have written on the subject. As will become apparent, some publications have a long history, going back as far as the early Twenties and Thirties of this century. We have tried to trace all these publications in order to comprise these in our overview. However, in spite of the willing support of libraries, many of these "oldies" could not be found in European sources of information. Even outstanding American libraries did not always possess the requested titles in their collections.

For this reason we have relied, to some extent, on discussions found elsewhere in literature. In this respect the study of Kennedy (1964) should be mentioned, as an excellent overview of the major contributions on purchasing performance measurement and evaluation prior to 1962. From that time we have tried to collect all other publications on the subject. However, the material found was so overwhelming, that discussing it in depth would fill another book. Therefore our discussion has been confined, rather subjectively, to the major contributions in the field.

4.2. Major contributions from 1920 to 1940

Overseeing this period it can be concluded that the orientation towards purchasing performance evaluation, as expressed by the first authors in the field, was mainly quantitative in character. As might be expected, the first authors on the subject do not indicate a very sophisticated knowledge of management control theory. We agree with Kennedy (1964, p. 44) that one of the reasons for this presumably is that management control theory itself, which at

present has provided valuable concepts, had not yet been really developed. Writers of the first decade emphasize that purchasing activities should be measured in order to control purchasing costs and to improve purchasing operations. The instruments, suggested for this purpose, are mostly of a quantitative nature. The purchasing departmental budget is suggested as an important element for control. Boffey and Gushee (1928) recognize that departmental operating cost expressed as a percentage of total purchase cannot be used as the sole criterion for evaluating purchasing performance. However, they failed in to provide a useful alternative.

An important step in the development towards a theory on purchasing performance measurement, was the contest organised in 1931 by the National Association of Purchasing Agents (NAPA).

One prize winning paper, submitted by Carney (1931) focused on three areas of attention i.e. (1) yardsticks to measure efficiency, (2) reports to prove the value of the purchasing function and (3) incentives to reward buyers. Carney suggested that the factors on which efficiency should be judged, were fairly well known. It was the measuring of these factors in objective terms that was the main problem. Carney suggested that measurement should focus on 1. clerical operations, 2. research of new markets and materials, 3. inventory economies and turn-over, 4. cost of materials purchased and 5. purchasing economies. The latter included all suggestions coming from the purchasing department to reduce production cost without changing the quality of the article or to improve the quality without an increase in costs. Carney was the first author who recommended incentives to stimulate purchasing performance.

In his contribution, Jones (1931) argued that past performance was not a safe criterion to appraise current accomplishment. He recommended instead the establishment of performance standards. These would be more useful for guidance and control as well as for comparison in evaluating purchasing activities. This author specified seven measures: 1. inventory turnover and ability to operate within the budget, 2. cost compared with market or standard for purchases, inventories and outstanding commitments, 3. depreciation and obsolescence of existing inventories, 4. flexibility of purchasing program and class of vendors purchased from, 5. losses due to lack of materials on hand for both production and maintenance, 6. income from scrap and salvage materials, 7. cost of psysical operation of department. All these measures were stated on a so-called

Purchasing Efficiency Statement, which combined these factors into an overall efficiency index.

Jones 's contribution is interesting since it gives consideration to the fact that purchasing may contribute, through a more efficient management of the company's working capital, to substantial cost-economies. Especially his concern for inventory-management is remarkable.

Clark (1931) suggested a Master Cost Sheet for the purchasing department. On this sheet all items should be stated which would affect purchasing cost. The cost of purchasing consists, in the view of this author of the following elements: 1. the price of things bought, 2. the expense of maintaining a department to buy things, 3. any expense caused by errors, losses or delays in securing them, 4. the expense of keeping and storing purchased materials from the time of their receipt until they are used.
To measure price effectiveness he suggests comparing average market prices with actual costs. Measures for departmental efficiency should include common items such as, salaries and wages, travelling expenses, supplies and stationery etc.
Clark's proposal is interesting since in his opinion purchasing cost cannot be isolated from other material related costs, including

- intrest on the investment represented by the inventory
- store costs
- losses from storage
- depreciation.

This view might be considered as an early conceptualization of what has later evolved as the materials management approach. Also in his view inventory management and purchasing are closely interrelated.

The value of this contest, in our opinion has been that several principles were identified, which should underly measurement of purchasing operations:

- these three contributors agreed that purchasing performance should primarily be measured in terms of cost;
- the subject of purchasing performance evaluation was considered to be broader than the mere prices paid for purchased materials and services;
- as common key-factors Department Expense, Inventory Control, Departmental Errors and Variation between Purchase Prices and Market or Standard Cost were identified.These key factors should be considered in any performance measurement system;

- standards of performance should be set and they should be derived from the objectives and responsibilities of the individual purchasing department; standards derived from other companies' practices should be considered less useful for improving its own efficiency.

4.3. Major contributions from 1940-1950

Also in this era the National Association of Purchasing Agents has given considerable attention to the subject of purchasing performance measurement. Furthermore, scholars became more interested in the purchasing profession as a field of research interest.

In 1945 a special NAPA committee, reported that any real measurement of purchasing efficiency should be broken down in two distinctive areas i.e. tangible factors and intangible factors (NAPA (1945) p. 2). The committee concluded that it was not possible to apply a mathematical formula or to establish an absolute yardstick for measuring the efficiency of all purchasing operations. This because purchasing performance is influenced by many intangible factors, which are difficult to grasp and to quantify. Intangible factors were identified such as:

- personal characteristics of the purchasing agent, executive ability and relations with the other divisions and executives;
- the value of goodwill secured for the company, through fair buyer - seller relationships;
- the return on expenditures from purchasing research and information.

It was concluded that it costs money to earn money, or to save money, an idea expressed earlier by Gusheé and Boffey (1928). However, although no single yardstick was available it was possible to evaluate purchasing activities by using various techniques.

The findings of this committee are illustrative for the way of thinking, which originated during the period from 1940 to 1950. The focus shifted from a mathematical, quantitative approach to a discussion of more qualitative approaches and techniques.

An interesting contribution during this period was made by Heinritz (1947). This author suggested an approach based on a materials budget, which permitted the development of an overall index. In his view a clear distinction should be made between purchasing proficiency and efficiency. Proficiency referred to, as Heinritz designated it, "purchasing's contribution to profitable company

operations", whereas efficiency referred to the cost of operating a purchasing department. Efficiency should be subordinated to proficiency, since Heinritz reasoned that it costs money to save money. In his words: "For every dollar saved in efficiency there are a hundred or a thousand to be made by proficiency in procurement" (Heinritz (1947) p. 8). It is important to maintain a high professional level in the purchasing department, since proficiency is specifically related to the professional skills of the people employed.
In Heinritz's opinion no really useful purpose is served by trying to force a relationship between proficiency and efficiency: expressing departmental cost as a percentage of total purchasing expenditure is designated as "the most common falacy" (Heinritz (1947) p. 584).
The ideas, as presented by Heinritz are interesting since they precede the ideas on management by objectives, as has been developed later in management literature. Furthermore, the ideas of this author have a long standing performance: they are still present in the latest edition of his textbook (1).

4.4. Major contributions from 1950 - 1960

In this period the field of purchasing management became more mature. This may be illustrated by the fact that in this period a number of textbooks appeared, written by University professors, which up to now are still leading in the field of purchasing education (2).
In this period the idea that many of the contributions of the purchasing function are difficult to grasp and consequently not easily measurable in a quantitative way became widely accepted. From this point of view, most writers described methods based on quantitative as well as qualitative measures to evaluate purchasing performance. The literature of the period reflects a growing appreciation of basic management concepts.
In order to measure purchasing performance, Ammer (1958) suggested four basic steps, which were related to the purchasing management process (3).
These steps were:

- define the limits of the purchasing job;
- determine the desired objectives to be achieved within these limits;
- develop a program to meet these objectives;
- compare progress on the program with objectives.

Although Ammer admits that these concepts are difficult to turn into practice, these still form the basis of his present ideas on purchasing performance measurement (4).

Furthermore the necessity of standards of yardsticks to measure performance gained further acceptance. Westing and Fine (1955) suggest, in order to evaluate purchasing performance, a comparison of the current and past performance within the department of those aspects of the purchasing function which are capable of statistical measurement and "the application of executive judgment" to the intangibles of purchasing.
Growing recognition of the many intangible factors affecting purchasing performance leads to development of qualitative and integral approaches. One of these is the development of the purchasing audit, a method primarily applied by accountants and controllers, to screen purchasing policies and procedures. Lewis (1952) recommends such an audit as a meaningful device to determine the adequacy of policies, procedures, organization structure, systems and research for improving purchasing operations.
This development reflects the idea, as presented by Heinritz, that a distinction should be made between purchasing effectiveness (or proficiency) and efficiency.

So far, only the major contributions towards the development of a philosophy on purchasing performance prior to 1960 have been broadly described. For an overview of this period the reader is referred to Appendix 1. at the end of this report.

4.5. The period from 1960 - 1970

Although purchasing management received considerable attention during the period from 1950 - 1960, this development did not continue in the next decade. Reasons for this are difficult to give. In the opinion of the author these may be found in the changed economic conditions of many western countries. During the Sixties it was not primarily a matter of how to produce the materials and products wanted, how to control end-products prices and how to get supply for production; rather, the problem was how to sell these products and how to capture large volumes in customer markets. In our opinion, these favourable market conditions in many western economies lead to an increased interest in market-oriented issues, away from supply related issues (5).

Among the contributions dedicated to purchasing performance evaluation, three stand out in our opinion. These are now more amply discussed.

The study of Hayes and Renard (1962)

In 1962 a large scale survey was conducted by Albert Hayes and George Renard on the subject of purchasing performance evaluation. The research was sponsored by the American Management Association.
A major objective of the project was: "to obtain information on the methods and procedures currently being followed to audit, check or otherwise evaluate the performance of the purchasing function" (p. 11).
The study was limited to industrial manufacturing companies only. Of the 201 companies, which responded to the survey, 72 percent reported that they did evaluate the purchasing department by some means. As Exhibit 3.1. shows, most of the methods, which were found, were primarily qualitative in character. They related more to procedures and communications than to 'hard' quantitative techniques. As a primary benefit, derived from evaluating purchasing performance these authors see the possibility to reveal weak spots in purchasing responsibilities and activities or as they put it (p. 13):

"In its fully expanded scope, the most profitable returns from an evaluation of purchasing performance may result from the closing of costly gaps, found to exist in the coordination and control of purchasing activities and responsibilities throughout the company organization".

This comment is interesting since it relates to the way purchasing activities are integrated with those of other departments within the company. Hayes and Renard do not consider purchasing as an isolated function, but they think that good coordination between purchasing and other material related areas within the company is required for an effective and efficient purchasing organization.

These authors consider purchasing performance evaluation as a process, consisting of three elementary steps (p. 95):

- purchasing policies should be established, that are explicit, that interpret company objectives, and that can be understood by everyone;
- procedures for operation should be formulated, responsibilities defined and delegated, and activities directed (these steps call for the need of planning);
- controls and standards should be instituted, results measured and, where advisable, adjustments made in policies, organization or operations.

Thus, these authors primarily view the purchasing evaluation process from a managerial point of view. This view to a large extent can be considered similar to that of Ammer (1958) and later that of Kennedy (1964), (see below).

EVALUATION METHODS	PERCENTAGE OF RESPONSES
- By internal audit	50
- By noting savings made through purchasing	24
- By comparing actual purchase price with standard	23
- By outside audit (government and consultants)	20
- By measuring variance of operating cost from department budget	19
- By comparing status of vendor relations with optimum, particularly as to delivery, quality, service and price	13
- By noting timeliness and accuracy of information submitted by purchasing to management on markets, prices, trends, supply, conditions, new materials, methods, etc.	10
- By appraising individual purchasing personnel	8
- By comparing actual inventories both targets or predictions	8
- By relating workload to personnel	6
- By evaluating participation in make-or-buy decisions	3
- By evaluating contributions to standardization and value analysis programs	3
- By comparing actual commitment position with target or forecast	2
- By evaluating the usefulness of reports from purchasing	2

Exhibit 4.1.:
Fourteen methods of Evaluating Purchasing Performance (Source: Hayes and Renard (1962)).

Since purchasing objectives and the responsibilities assigned to the purchasing department may vary among companies, Hayes and Renard conclude that there is no single method of evaluating purchasing performance. This conclusion is reflected in a statement of Bradford Cadmus, former director of the Institute of Internal Auditors (U.S.A.) when he says:

"there can be no standard for purchasing performance evaluation, because there is no standard performance, organization, limitation, authorization, expectation or management" (quoted by Hayes and Renard (1962) p. 15).

Evaluation methods did not appear to differ between companies due to size, type of industry and/or degree of centralization. However, more important for the

degree of formalization and actual techniques used were the expectations of local management towards its purchasing organization. This has been the first reference, found in literature, of the fact that the attitudes of top-management towards purchasing may affect purchasing performance evaluation.

The study of Kennedy (1964)

In 1964 Kennedy published the results of a study of the history and development of a philosophy of evaluating purchasing performance. This study provided a detailed overview of the major contributions on purchasing performance evaluation. However, the purpose of the study was to establish to what extent "end product costs attributed to purchasing operations are the ultimate measure of purchasing performance" (p. 6) for the author tried to investigate what factors of purchasing departmental costs affected endproduct costs most.
The research method consisted of a mail questionnaire, which was sent to 412 industrial companies in various industries; 116 questionnaires were returned.
Its linear correlation analysis appeared to indicate little or no relationship between purchasing department operating cost and end product material cost.
Only 54 percent of the companies, which replied, tried to evaluate purchasing departmental performance. Considering the relatively high non-response rate (± 72%) the actual figure probably was lower for American industry as a whole.
Other findings of this study were (p. 163):

- approximately 60 percent of the firms, which replied, did not have written performance standards;
- only 5 percent of the companies utilized work measurement as a basis of standard development with the percentage increasing with company size and value of purchase;
- the use of dollar incentives for increasing buyer performance is very limited with only 8 percent of the companies indicating its use;
- less than one-third of respondent companies utilizes a material budget while about 40% utilizes an operating budget;
- the factor most frequently used in evaluating purchasing performance is inventory turnover; almost 90% of those companies, which said they evaluate purchasing performance, indicated they utilized inventory turnover as one of the factors;
- less than 40% of the companies had a departmental manual with written department objectives and policies;

- 30% of the companies indicated they believed purchasing performance could not be evaluated;
- the larger the dollar value of purchases the more likely it is that the organization attempts to evaluate purchasing departmental performance.

When we compare the findings of Kennedy with those of Hayes and .Renard, we perceive considerable differences. For instance the latter report use of savings/reductions amounting to 24%, whereas Kennedy reports 68%. A similar difference is found regarding formal buyer evaluation where the figures are 8% and 24% respectively. Irrespective of the fact that two years elapsed between the two studies, these differences may be ascribed to the characteristics of the industries involved.
However, differences may also result from differences in methodology and questionnaire design. It may be assumed that research in purchasing performance measurement is a difficult and delicate matter and that the research methodology applied may affect the outcome of the study.

However, the research of Hayes and .Renard, and Kennedy was the first evidence found of empirical studies on the subject of purchasing performance evaluation.

The contribution of Pooler (1964)

Based on ideas developed by Likert (1961), Pooler identified three areas, which should be considered, when evaluating purchasing activities i.e. 1. conceptual, 2. behavioral and 3. resultant areas. Applied to purchasing these concepts were explained in the following way:

Conceptual	Behavioral	Resultant
how the purchasing manager perceives his job what motivates the purchasing manager	what the purchasing manager actually does	low prices paid efficient buying group good vendor relations good internal records good savings records etc.

From this picture it is clear that analysis of end results is not enough because it fails to show how improvements can be made. To be able to find the underlying causes of disappointing performance, behavioral and conceptual aspects of purchasing activities should also be considered.
The ideas, as expressed by Pooler, are interesting since they reflect the fact that measurement should primarily be done to stimulate improvement. As Pooler states: "The purpose of any standard is to effect an improvement, otherwise it is wasted effort". Furthermore, he considered measurement as an important tool for motivating buyers (an aspect, which until then had not been mentioned before in purchasing literature). Measurement should not be done in order to control people, since this may have negative side-effects. To realize this, the purchasing manager should first make clear that measurement can help both the buyer and the department. In terms of Pooler: "The object is to set goals which the buyer himself helps to establish, but also to make him aware of his shortcomings so as to encourage future growth" (p. 221). It is recognized, when evaluating actual results, that also the intangible aspects of purchasing activities should be given consideration: "To properly measure the performance of our buying personnel a combination of quantitative measurements and supervisory review must be utilized".
As Lewis (1952) and Heinritz (1947), Pooler stresses the importance to also differentiate between efficiency and effectiveness. However, these concepts are broadly discussed by detailed examples, without providing some sort of definition.

4.6. The period from 1970 - 1980

This period can be characterized as a period with a renewed interest for the purchasing function. After a period of long sustained economic growth most western economies during the Seventies were confronted with increasing costs of labour and energy. Moreover the Oil-crisis of 1973 lead to price increases of many raw materials and consequently to more expensive end products. Since many consumer and industrial markets became more saturated and competitive, these cost-increases could not be offset by selling higher volumes. As a result companies started to look for opportunities to reduce costs; it was felt that the materials area could significantly contribute in this respect.

On the subject of purchasing performance measurement two important empirical studies were conducted, both of which are discussed below.

The study of Stevens (1978)

In his study "Measuring Purchasing Performance" Stevens (1978) described the results of a study conducted among 105 British industrial companies. Its major objective was to identify what differences existed in purchasing performance evaluation by industry, by size of the firm, by reporting position of purchasing and by purchasing turnover-ratio.

Based on the results of his study the author concluded that (p. 212):

- the higher purchasing reports in the organization the more heavily it uses a range of evaluators;
- the bigger the spending, the more heavily the company uses a spread of evaluators;
- where the percentage materials cost/total cost ratio lies between 40 and 60%, the more likely purchasing is to use a spread of evaluators;
- subsidiaries of American companies are generally more aware of the need to evaluate purchasing performance than their UK-owned counterparts.

Comparing his results with those of Hayes and.Renard (1962), Stevens perceived a growing recognition of the impact of purchasing on corporate profitability, and the need for the function to be evaluated.

Stevens concluded his study with some personal observations. First of all he was convinced that purchasing performance could be measured. The thought that this could be done by one single measure was rejected: a number of yardsticks should be used in order to do this. Furthermore, he noticed that the quality of the purchasing organization to some extent may be derived from the number and type of measures actually being used. As he says (p. 188): "there is also clear evidence that the changing role of purchasing - particularly in respect of its involvement in policy areas such as make- or-buy, supplier development, reciprocal trading, and its general contribution to corporate affairs - is reflected in the use of yardsticks which monitor the degree of quality of this involvement".
However, this assumption is not sustained by evidence, in the form of quantitative data, collected during the survey.
Another observation was that any measurement system aimed at improving purchasing performance should relate to the objectives and goals of the purchasing function. In words of Stevens (p. 188):

"... and the basic test is whether purchasing can obtain goods and services from the market to conform with price, quality, volume and time requirements. Measurement based upon these fundamental objectives are still the foundations for measuring purchasing performance".

Although the study suggests that it is representative for British industry, it covers only the practices of 105 UK-based companies. Furthermore, the survey is conducted among 21 industries which implies that on average only 5 companies per industry participated. For these reasons it is safe to conclude that the results of the study are not generalizable for British industry as a whole, as the author suggests.
However, this study is valuable in that it describes the degree in which purchasing performance measures are being used at the 105 companies, which participated in the research.
Some comments should be made concerning the research methodology used. Since this is not described in his book, the reliability and validity of the results are difficult to assess. Nothing has been said about non-response influences, about the people actually having answered the questionnaires, sample selection, etc. For this reason comparison with other studies is a delicate matter and has been omitted here.
Although often used, Stevens does not exactly define purchasing performance. Terms as purchasing effectiveness and efficiency are used interchangeably without recognizing the fundamental differences between these two concepts. Finally, the author describes several measures (often accompanied with detailed explanations and examples of reporting formats) but he did not succeed in putting them into a conceptual framework. Nor did he state or formulate the conditions which measurement systems in purchasing should meet in order to be effective. For these reasons the findings are in our opinion of limited practical value and difficult to use for formulating hypotheses in future research.

The study of Michigan State University (1979)

In 1978 the results were published of a research-project, conducted by Monczka, Carter and Hoagland, researchers of Michigan State University. It was the first time in 15 years that the subject of purchasing performance measurement had received attention in the academic field within the USA. The focus of this study was to identify measures of purchasing performance that were being used in

public and private organizations. It was to provide information about development, improvement and use of purchasing measures and measurement systems. Eighteen organizations were selected for this in-depth study. The criteria, used to select the research sample, were: evidence of an advanced purchasing measurement and evaluation system and willingness of the organization in supporting the research. Therefore, the results of this study are not representative for American industry as a whole. A number of different industries was included in the final sample to provide breadth to the research. The companies selected were operating in the aerospace, appliance, automotive, chemical, computer and electronics industries. Governmental organizations belonged to the Air Force, the Navy, the Army and the Defense Supply Agency.

The research revealed over 250 different measures used by the selected companies to measure purchasing performance. These measures were classified in the categories stated in Exhibit 4.2.

Purchasing measure categories	*Aerospace* #1	*Appliance* #2	*Automotive* #3	*Chemical* #4	*Chemical* #5	*Chemical* #6	*Electronics* #7	*Aerospace* #8	*Computer* #9	*Aerospace* #10	*Electronics* #11	*Appliance* #12	*Computer* #13	*Public* #14	*Public* #15	*Public* #16	*Public* #17
Price effectiveness	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cost savings	*	*	*	*	*	*	*	*	*	*	*	*	*		*		
Workload-in	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*
-current	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*
-completed	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Administration and control	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Efficiency	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Vendor quality	*	*	*				*	*		*	*	*	*				
delivery	*	*	*		*		*	*			*		*		*		
Material flow control	*	*	*		*		*	*	*	*	*	*	*				
Regulatory/societal/environmental	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Procurement planning and research	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Competition				*				*	*					*	*	*	*
Inventory	*	*	*	*		*		*					*				
Transportation	*	*	*														
Purchasing procedure audits				*		*		*					*	*	*	*	*

NOTE: Asterisks indicate some purchasing measures in use in the purchasing department.

Exhibit 4.2.

Purchasing measures by research site (Source: Monczka c.s. (1978), p. 28)

Some important conclusions of this project were that:

- price effectiveness, and administration and control measures were in general the highest rated

- there were no significant systematic differences between the public and private sectors over the thirteen dimensions rated
- on average managers rated the measures higher than non managers did.

Monczka c.s. identified, based on their statistical and qualitative analysis a number of key purchasing indicators which were most useful in effectively managing the purchasing function. Given the frequency of use, ratings and qualitative statements of the respondents, the indicators most appreciated were:

- actual-to-plan and actual-to-market price effectiveness measures
- cost reduction measures
- administration and control measures
- inventory measures, if part of purchasing responsibility
- material flow measures to ensure an adequate and timely flow of purchased items from vendors
- vendor characteristics such as annual purchase from each vendor
- workload measures, especially where a high volume of purchasing workload existed.

The researchers themselves added some personal notes to their conclusions. An interesting one is that in their opinion more measurement does not necessarily lead to improved performance. Measurement has its cost and management should balance the costs as well as the benefits derived from such an activity. They also recognized (p. 288) that not all aspects of purchasing performance lend themselves to quantitative measurement. According to the researchers, instruments should be developed to recognize performance on a non-quantitative basis. Another observation from the researchers was that there is probably no best way known to measure purchasing performance. Measurement systems in the field of purchasing should be adapted to the specific circumstances of the company and the purchasing environment. Finally these authors do not see a single, overall productivity measure representing purchasing performance feasible, due to the multiple dimensions of the purchasing job.

The greatest value of the research conducted by Monczka c.s. is that the purchasing indicators which it revealed, provide benchmarks for individual company analysis. The researchers succeeded in revealing 250 different purchasing measures, being used by leading American multinational companies and large governmental organizations. Furthermore, they gave insight into the usefulness of the various measures by describing the comments of the people interviewed. For the first time the advantages/ disadvantages and benefits

involved in purchasing performance measurement have been inventarized in a systematic way.
A comment on this study is that it was not able to identify external or organizational factors which may enhance the use of performance measures. In what situations are the measures used and when are they most useful? What conditions should be present for designing and applying purchasing measures under what conditions are they most useful? No specific answers were provided to these questions. Although several industries were involved in providing breadth to the study, differences found in general were not significant and where they were, they were not (thoroughly) analyzed. This may be regretted since it was suggested that practices used to measure purchasing performance could vary to a large extent among industries.
Another comment is of a more conceptual nature. Although often used, purchasing performance was not defined in the study. The same applies to purchasing effectiveness and efficiency, which are diffrent concepts in themselves. A distinction should be made and a clear definition of both concepts is needed in order to develop some guidelines for purchasing performance measurement. Furthermore, it should be recognized that measurement is in fact a derived activity: it can never exist in itself. It is subordinated to a higher goal, which may be lower purchasing prices, lower purchase content in endproducts etc. Monczka c.s. failed to show the connection between their measures and the goals and objectives, underlying purchasing management. Therefore, in our view, their study has more value for theorists than for purchasing practitioners.

4.7. Some other contributions

Our discussion has been limited, up to now, to American and English textbooks and articles. Our survey, however, also comprised contributions on this topic which appeared in other countries. These appeared to be very limited. Purchasing management in general and purchasing performance evaluation in particular was found to be a rather neglected area. Textbooks and articles, covering this area were very limited in number and also research appeared to be modest.

A sophisticated discussion on the subject of purchasing performance measurement was found in Arnolds, Heege and Tussing's book "Materialwirtschaft und Einkauf" (1978). These authors state that, in order to evaluate purchasing activities, quantification to some extent is inevitable, but they are aware of its limitations. As they put it (p. 313):

"Kenziffern wie Zahl der Bestellungen pro Einkäufer, Zahl der getätigten Anfragen pro Bestellung, Einkaufvolumen pro Einkäufer und Bestelkosten pro Bestellung, haben ihre Bedeutung weitgehend verloren. Sie versagen bei der Beurteilung beratender, entscheidungsvorbereitender und enscheidender Tätigkeiten, geistiger Aktivitäten, die sich der Beurteilung durch Kenzahlen entziehen und sich letzlich nur am Ergebnis bzw. Erfolg würdigen lassen".

In their view a distinction should be made between cost control and performance control. Cost control should be aimed at minimizing all material costs and at identifying unfavorable developments in costs. Performance control should focus primarily on the evaluation of individual buyers.

Even when such a distinction is made, an objective evaluation of purchasing activities is still not possible due to the many factors, which cannot be influenced by the purchasing department. These "intangibles" may relate to:

- external factors, such as the supply market situation, economic circumstances, new technologies and scarcity;

- internal factors, such as rush-orders due to changes in production-schedules, reciprocity etc.;

These factors should be considered when assessing purchasing performance. Arnolds, Heege and Tussing identify three basic methods, which can be used in this respect i.e. time-, intercompany-, and "soll-ist"-comparison. The latter is in their view the only viable method (p. 314):

"Der Zeitvergleich scheidet wegen der temporären Schwankungen der Beschaffungsmarktes aus, der Betriebsvergleich wegen der Unvergleichbarkeit mehrerer Unternehmen infolge unterschiedlicher Einflüsse anderer Unternehmensbereiche auf die Materialwirtschaft, so dass überwiegend der Soll/Ist- Vergleich angewandt wird".

With respect to cost-control the authors identify three areas of major importance i.e. direct costs, costs of orders processed and inventory costs.
Direct costs refer to costs of purchased materials. They may be evaluated by comparing them with those of previous periods. However, this procedure has important limitations, since changed market conditions, which cannot be

influenced by the individual buyer, may hamper a clear interpretation. An alternative is a price-index based on market-prices of various products belonging to one product-group related to a purchasing standard price. This standard price should reflect the best forecast for the coming year.
Costs of orders processed are difficult to assess, since they are directly related to the number of orders issued. First, they can be easily manipulated by the individual buyer and second, they relate to fixed costs, which cannot be influenced by the buyer. So this ratio has only limited value.
Inventory costs are measured by capital turnover ratios which measure the degree to which invested capital is used effectively. A problem in this area is to assess the optimal level of buffer stocks.

Arnolds, Heege and Tussing agree that without good people there cannot be good purchasing performance (p. 321):

"Eine wichtige Voraussetzung fur die .Realisierung des materialwirtschaftlichen Optimums liegt also in der Person des Einkäufers, was nichts anderes bedeutet als dass der richtige Mann am richtigen Platz die beste Gewähr für eine optimale Beschaffung bietet".

This thought is supported by Berchtold (1979), (1979a) who focusses her discussion on evaluating buyers in a more personal way. In her view evaluation of purchasing personnel should be fair and honest. If applied properly it can contribute to better motivation and it can keep the buyer on the trail. Quantitative figures may support the evaluation but should never be used independent of subjective judgment.
However, the problem of a more subjective approach to purchasing performance evaluation is that adequate guidelines or standards in this area do not exist (p. 69). For this reason often quantitative measures are used.

Considering these limitations Berchtold focuses on how to evaluate the human factor in purchasing i.e. the individual buyer. In her opinion performance evaluation systems in purchasing are often applied for justifying differences in pay and reward between buyers. However, according to Berchtold, this should not be the prime objective for buyer-evaluation. Evaluating systems should be used to increase effectiveness through better motivation. In this respect such a system should evaluate whether previously established tasks and objectives have been adequately met (p. 70):

"Fur die Erfolgermittlung und Verstärkung der Erfolge des Einkaufbereichs steht denn auch nicht eine Ermittlung des leitungsabhängigen Lohnanteil im Vordergrund des Interesses ..... sondern eine Uberprüfung der gesetzten Ziele unter der Möglichkeiten zur Erfolgsverbesserung".

In her view evaluating systems need to be adapted to the tasks and goals of the purchasing organization. This implies that purchasing operations of different companies are difficult to compare. Comparison is hampered by (p. 71):

- the fact that purchasing operations tend to differ in scope;
- lack of objectivity: evaluation is influenced by the selective perception of the one who evaluates;
- limited reliability: depending on circumstances and time different weights may be assigned to the various elements of buyer-performance.

Berchtold recommends evaluation in the form of a formal conversation between buyer and superintendent.

Other German contributions towards purchasing performance evaluation (such as Benz (1976), Köckman (1978) and Beschaffung Aktuell (1979)) are rather quantitative in scope, covering in most cases various measures. These are discussed in the next chapter on purchasing-evaluation methods and techniques.

In The Netherlands contributions on the subject of purchasing performance evaluation have been very modest. On this subject only two articles were found, both by Dijkers (1976, 1980). In his 1976-article a number of quantitative performance measures and ratios are described, whereas the more recent contribution puts the subject into a broader perspective. Subjects are discussed such as checklists for assessing departmental performance, budgetting methods in purchasing, statistical techniques etc. Since no actually new ideas are presented, this author is not discussed here in more depth. Comments on performance measures will be given in Chapter Five.

4.8. Conclusions and Some Observations

Our literature survey has uncovered many textbooks, research reports and articles on purchasing performance measurement and evaluation. The material, however, was too much to permit a discussion of each contribution. Moreover, most articles appeared to contain few original and provoking ideas. Rather subjectively, our discussion has been limited to the major contributions. Having

gone through the literature, we got the impression that the interest for purchasing management, - and for purchasing performance evaluation in particular -, to some extent was related to the business cycle. The concentration of articles during the Thirties (when there was a major slump in the world economy), the period from 1945-1955 (when the world had to recover from World War Two) and the late Seventies (after the Oil-crisis in 1973) is remarkable.

From the material discussed in this Chapter some general observations can be made:

- there is general agreement among authors that there is no universal method to evaluate purchasing performance; due to variations in purchasing's scope among companies and industries, methods and techniques need to be adapted to specific situations;

- purchasing performance cannot be expressed by a single index; if quantification is preferred, several indices are needed, which should be accompanied by background information on how these indices were derived and explaining by what factors variations (if any) were caused;

- there is no common opinion as to what should be measured when evaluating purchasing performance; some authors suggest end-products costs as the "ultimate measure" (e.g. Heinritz (1947)), whereas others include conceptual and behavioral aspects (e.g. Pooler (1964)); however, there is general agreement that purchasing performance evaluation should cover both purchasing effectiveness, as well as efficiency;

- in order to evaluate purchasing performance, objectives and responsibilities underlying purchasing activities should be clearly defined and assigned within the company;

- purchasing is not an isolated function; the fact that purchasing performance is strongly affected by other departments within the company implies that good or bad performance cannot be wholly ascribed to the purchasing department;

- planning precedes control; in evaluating purchasing activities objectively, objective performance standards are required;

- purchasing performance evaluation should be done to improve purchasing operations; more recent authors emphasize increased morale and motivation, which may result from an activity.

Following these general conclusions we would like to add the following comments:

- although a differentiation is sometimes made between purchasing effectiveness and purchasing efficiency, a clear definition of these concepts has not been found; neither were techniques and measures, as suggested, related to these concepts;

- a conceptual framework underlying the subject of purchasing performance measurement and evaluation is lacking; the various ideas, techniques and measures have not been integrated into a meaningful whole, which may provide guidelines for purchasing practitioners;

- it is remarkable that only in a few instances, purchasing performance evaluation has been related to the purchasing management process; most authors discuss it as a rather isolated issue;

- recognizing that purchasing performance evaluation may lead to increased motivation, more attention needs to be given to the conceptual and behavioral aspects of measurement (see Chapter Three);

- in discussing the various techniques, most authors commented on their accuracy (scientific point-of-view) rather than discussing whether they were useful for their intended purpose (managerial point-of-view);

- in most discussions, the buying situation and/or technical complexity of the product to be purchased (see Chapter Two) were not recognized as factors that might influence the use of the various methods for evaluations;

- emphasizing cost-reductions as a primary measure of purchasing performance can easily lead to suboptimalization; rather than evaluating purchasing in terms of cost reduction, we think purchasing should be valued on its contribution to the company's long sustained profit and/or growth.

In general we may conclude that the ideas, as have been developed in management control literature, are reflected only to a limited extent in the literature on purchasing performance measurement and evaluation.

Notes to Chapter Four

1. See Heinritz and Farrel (1971) Chapter 24, p. 421-443.

2. See for instance: Lewis (1952), Westing and Fine (1955)and Aljian (1958).

3. See our discussion in Chapter Two.

4. See the latest issue of Ammer's book: Materials Management and Purchasing (1980).

5. Support for this view may be found in the fact that during the Sixties marketing has developed as a profound discipline, that gained acceptance in many companies and universities (see e.g. Hughes (1978) pp. 4 - 7, Kotler (1980) pp. 11 - 13) and McCarthy (1981) pp 29 - 31). Compared with marketing as a discipline the number of textbooks on purchasing management is fairly limited.

CHAPTER FIVE: METHODS FOR EVALUATING PURCHASING PERFORMANCE

5.1. Introduction

Over the years many methods have been developed in literature in order to get a better idea of purchasing's effectiveness and efficiency. However, they are so numerous, that they cannot all be discussed separately. Therefore we have classified these methods in the following groups:

1. Budgetting methods in purchasing. A budget is a financial and/or quantitative statement of the policy to be pursued during a defined period of time for the purpose of attaining a given objective (Baily (1978) p. 291). In the purchasing area several budgets may be used e.g. for the purchased materials, for MRO-items, and capital investments.

2. Purchasing cost savings. These refer to the extent to which the purchasing function is able to lower total costs of purchased materials. Often a distinction is made between cost-reduction efforts, cost-avoidance and return-on-investment measures (i.e. improvement in ROI based on cost-reductions obtained).

3. Ratios and indices. A ratio represents a mathematical relationship between two numerical entities.

4. Purchasing reports. Information on how the purchasing function operates may be regularly reported to top-management. These reports may be informal as well as formal.

5. Audit. The purchasing audit is a review-procedure to ensure that proper procedures relative to sound purchasing and management principles are being applied. Audits may be performed by company experts as well as by outside consultants.

These methods may be used to evaluate purchasing performance and are discussed below in more detail.

5.2. Budgetting methods in purchasing

In the company's budgetting system a manager for a certain responsibility area is given financial limits within which he has to plan the activities for this area in accordance with the general objectives and the policies of the company. Due to its financial importance and the fact that purchased materials are used within most functional areas in the company (varying from capital equipment in the production department to pencils and paperclips in the adminstration area), the purchasing function plays an important role in the company's budgetting cycle.Therefore it is necessary to focus on the specific roles of the various purchasing budgets within the company's budgetting cycle or more specifically within the materials planning process.
A purchasing budget is broadly defined in this context as the quantitative reflection of the costs of materials and resources, which are necessary to meet the material requirements of the company within a specific period.
As we have seen in Chapter Two, several budgets may be used in purchasing, which are closely related to the materials planning process. Here, we focus our discussion on the purchasing materials budget, the MRO-budget and the investment budget. The purchasing departmental budget is not further discussed here.

The purchasing materials budget

This budget basically consists of two kinds of data, namely 1) data concerning the volumes to be purchased and 2) data referring to the price which is expected to be paid. In this way the purchasing materials budget serves as a planning as well as a control-instrument; afterwards, actual expenditure can be compared with the budget and variances can be identified and analyzed. Further, it serves as a device to delegate responsibility, since it defines the financial limits, within which the purchasing function should operate.

This kind of budget in the purchasing area is very important, if one realizes that about 55% of the sales-dollar is spent on materials costs (see Chapter One). Price-forecasting, therefore, is of utmost importance. However, it is a delicate matter. If purchasing price-estimates for major materials and components are too high, this may ultimately lead to unfavorable prices in the customer-end use markets (and, hence, may affect the company's competitive position). If on the other hand, estimates have been too low, the company has sold its products at a too low price, and it may end up losing money. Of course, this problem is especially crucial in end-use markets, where strong price competition

exists. Since this applies to many markets under the present economic conditions, it may be concluded that forecasting future purchasing requirements and -prices is an important element in the company's competitive strategies.

Of course, the purchasing materials plan cannot be established by the purchasing function alone. For the more important purchased items, industrial engineers are often asked to develop independent forecasts of material prices, based on recent technological developments (1). Other personnel involved in the materials planning process generally include financial specialists, manufacturing personnel and top-management (Monczka c.s. (1978)).
Purchased material budgets may relate to four reporting levels, which may differ with regard to their degree of detail. These reporting levels may relate to (see also Exhibit 5.1.):

- the overall purchased material budget;
- the material budget for major purchased product groups or -families;
- material budget for major end-products sold;
- material budget for line items.

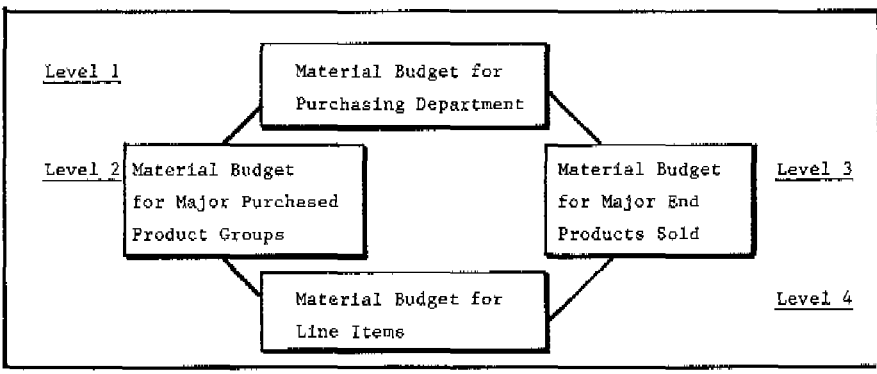

Exhibit 5.1.:
Classification of Purchased Material Budget (Source: Monczka, Carter and Hoagland (1979) p. 56).

This classification was being used in practice to report purchasing price variances from plan.

The MRO-Budget

Planning and budgetting purchasing requisitions for maintenance, repair and operating supplies is usually based upon past usage history plus a safety level and a future use or requirement estimate.

For instance if a turbine generator is to be overhauled at a specific date in the future, purchasing could help to predict the leadtime required for ordering the materials required in the overhaul.

Although it is not the place here to discuss inventory policies, it should be noted that one of the problems with regard to purchasing planning in this area is the "pipeline-effect". This refers to the quantity of materials used up over the period of time that is required for the material to be distributed to the actual using address or location. This is a complicating element when planning purchases of MRO-items for a longer period.

The investment-budget

The master production schedule provides an indication of the degree to which the present production capacity will be utilized. If production requirements exceed capacity, two possibilities exist: capacity may be expanded or excess production capacity may be subcontracted to suppliers. In both cases costs are incurred in capital equipment and/or tooling equipment for suppliers. For this reason a distinction is sometimes made between:

- a capital equipment budget reflecting future investments
- a supplier-tooling budget reflecting additional investments in equipment located at the suppliers or subcontractor's manufacturing facilities.

The establishment, authority and control of these budgets is often beyond the scope of the purchasing function. Due to the commercial risks involved and policy considerations (such as maintaining a flexible response to market needs) investment - and tooling-decisions are the prerogatives of plant- and/or top-management. However, due to their affiliation with purchasing activities the execution and monitoring of investment- decisions is often delegated to the purchasing function.

It can be concluded that purchasing's role in the company's budgetting cycle is essentially three fold:

- assisting the various segments of the organization in building up their individual budgets, by providing information on costs of production

materials and components, costs of MRO-parts, and their planned new capital equipment;
- monitoring the physical goods expenditure against individual budgets;
- establishing and controlling its own operating budget.

Benefits of Purchasing Budgets

Having described purchasing's role in the company's budgetting cycle and its various budgets, the question is raised as to why these budgets should be established. What are their benefits of purchasing budgets and limitations? Generally, the following reasons are mentioned for supporting budgetting systems in the purchasing area (2):

- budgetting may provide better control, since it attempts to correlate the expenditures for materials and supplies with the predicted needs and indicated market trends;
- budgetting helps accomplish established inventory turnover rates since variances from targets are identified;
- a purchasing budget may provide standards for performance evaluation;
- a purchasing materials budget enables other departments in the company to coordinate their activities with those of the purchasing department;
- budgetting means that plans have been formalized to the extent of being put into writing and thus become a matter of record;
- budgetting helps keep materials in balance;
- a purchasing budget permits the adequate and orderly planning of financial resources to meet the material commitments.

These benefits are only arrived at, however, if the following conditions have been met (3):

- purchasing objectives and policies should be clearly defined, communicated to and well understood by all purchasing personnel;
- purchasing authority and responsibility should be clearly established and sanctioned by top managment; it should be clear what activities should be conducted by the purchasing department and what activities belong to other departments;
- the purchasing personnel involved should be able to participate when deciding on budget constraints and should agree upon them;

- regular feedback-information on budget performance should be provided; this information should be presented in a formal and comprehensive way.

As Ammer suggests ((1980), p. 610-611) the major shortcomings of materials budgets in most (American) companies are that they do not meet all these requirements. More specifically this author indicates that a regular feedback on results is often lacking. Another issue, which he raises, is that variance figures rarely, if ever, show why a price has changed.

In addition to our previous comments, we would like to observe that:

- budgetting in purchasing in most cases only includes the direct or production materials and departmental expense, whereas indirect materials remain out of focus;
- the advantage in any budgetting procedure in the purchasing area in our opinion is the fact that it forces the buyer to systematically plan his commercial activities; through doing this he is required to gain greater knowledge about suppliers, products, and product-markets; a budget, therefore, has important implications for the professionalism of the purchasing department.

Budgets as Tool for Buyer Evaluation

Is a materials budget, as sometimes is suggested in literature, an appropriate tool to evaluate individual buyer performance? In answering this question the following should be considered.

- A major difficulty, when using a materials budget to evaluate buyers, lies in the fact that purchasing personnel should buy what is needed rather than what has been forecasted. A materials budget should be considered as a means to help improve purchasing activities, however, it should not be considered as an end in itself.
- A direct relationship between purchasing resources and purchasing output does not exist; although many output variables of the purchasing function (such as number of orders, quantity and quality of materials ordered, number of supplier-visits) can be measured quantitatively, these cannot be related directly to the input variable (such as man hours, costs) used. For instance, when a buyer issues twice as many orders per month than another buyer, this does not imply that his work is twice as good or that he is

twice as effective. The same applies to a buyer who conducts three times as many vendor-plant visits as his colleague; obviously he will not be three times as effective.

- Another aspect, hampering an objective evaluation of purchasing activities, is the lack of what has been designated by Faes ((1982), (1982a)) as, the limited manoeuvrability of the individual buyer. Due to external and internal constraints, the buyer is often not free to decide on volumes to be ordered and to choose from what suppliers he should order from.

It can be concluded that a general answer to our question is not possible. Whether or not a purchased materials budget can be used to assess individual buyer performance, will depend on:

- the characteristics of the supply market situation; is the price to be paid a fact (such as in buying commodities) or do material prices provide room for negotiation (such as when buying customer made components); when measured on his price-performance, a buyer should be able to exert some influence over the prices, that have to be paid;
- the tasks and responsibilities as assigned to the individual buyer relating to the degree of delegation e.g. to his freedom to select vendors, to decide on when and how to order etc.;
- the characteristics of the materials requirements planning process; frequent changes in production schedules may affect purchasing volumes and hence, the prices to be paid to suppliers.

5.3. Purchasing cost-savings

Earlier we concluded that one of the major problems in evaluating purchasing performance was, that no direct causal relationships exist between purchasing resources and results.
When evaluating cost-savings on materials purchased, similar problems occur. These problems can more specifically be adressed as:

- how should cost-savings in purchasing be defined?
- how should cost-savings be described to the purchasing department; who should get the benefit?
- how should cost-savings be assessed?

These problems are described below in more detail. As we will see, they are closely interrelated.

Defining Purchasing Cost-Savings

There is no common opinion on how purchasing cost-savings should be defined. Empirical studies, such as conducted by Stevens (1978) and Monczka, Carter and Hoagland (1979) suggest that definitions vary depending on the scope of the purchasing function and the company's administrative policies and procedures. Monzcka cs ((1979) p. 82) define purchasing cost-saving measures as: "those measures used to concentrate attention on efforts to reduce purchasing costs".

Savings in purchasing costs may be divided into cost-reductions and cost-avoidance. The definitions, which these authors provide, are:

- cost-reductions: these require that the purchase price be reduced from the last price paid;
- cost-avoidance: the difference between the price paid and a higher price that might have been paid, had purchasing not obtained a lower price; for example, if the price paid was lower than the originally quoted price, the difference could apply as a cost-avoidance.

Both cost-reductions as well as cost-avoidance are measured in terms of dollars saved or expressed as a percentage of purchasing turnover. Also during our research we have found both concepts being used by some companies to monitor purchasing performance.

A general guideline for determining purchasing cost-savings is whether or not the saving was achieved by unusual or extraordinary action. In this view savings achieved through routine procurement activity at an individual's normal competency level should not qualify. Within this framework differences between any two bids are not considered to be cost reductions or cost avoidances. The same applies to differences between any bid and a negotiated price.

Who should get the benefit?

An important question is to what extent savings as accrued can be ascribed to the efforts of the individual buyer and/or the purchasing department. This problem appears to have been barely discussed in purchasing literature. However, to us it seems a fundamental problem when using purchasing savings as performance indicator.

Assessing purchasing cost-savings

How should a saving, once it has been achieved, be assessed? This problem directly relates to how a standard for evaluating cost-saving potential should be established. Some authors (e.g. Leenders, Fearon and England (1980) and Baily and Farmer (1982) suggested Management By Objectives as a proper technique. However, in our opinion their discussions have remained too general in nature to provide purchasing personnel with some practical guidelines.

It is our conclusion after a study of some major textbooks, that the subject of purchasing cost-savings measurement is treated poorly and does not reflect the importance of the subject. This is in contrast to what the purchasing managers of some leading companies said, who were interviewed during our research. Many of them considered cost- reduction programs as a highly valuable instrument to make buyers more market- and planning oriented. On the other hand we must admit that the majority of smaller companies, who were involved in our research, as will be shown later, do not measure purchasing effectiveness in terms of its contribution to company profit. However, we consider this to be a major obstacle in gaining better recognition of the purchasing function and in developing the purchasing area into a professional discipline.

5.4. Ratios and Indices

5.4.1. Introduction

As has been shown in chapter three, the early authors in the purchasing field had a preference for quantification of purchasing performance. Many attempts have been made towards expressing purchasing effectiveness and efficiency in some numerical way by measures or ratios.

According to Dijkers (1976) ratios serve several purposes:

- they provide information on events which are important to a manager;
- they may be used in evaluating or interpreting data;
- they may help in forecasting future events;
- they may be used to identify and/or analyze variances from previously established standards in order to improve purchasing activities.

These points agree with the opinion of Benz (1976) who states in this respect:

"Aussagefähige Kennzahlen in der Beschaffung zeigen dem Beschaffungsleiter und seinen verantwortlichen Mitarbeitern ein objektives Bild über die Situation der wichtigsten Teilfunktionen und ihre Entwicklung im Zeitablauf. Sie ermöglichen es die vielfältigen Tätigkeiten im Beschaffungsbereich zu überblicken, zu steuern sowie laufend zo kontrollieren und bilden so die Grundlage für eine erfolgreiche Durchführung der Führungsaufgaben in diesem wichtigen Unternehmungsbereich".

However, since they often incorporate information in a condensed way, ratios have important limitations (Dijkers (1976), p. 174):

- they may lead to wrong conclusions, usually resulting from a bad understanding of what the ratio actually reflects;
- they may easily lead to generalizations, if a ratio pertaining to only a limited number of variables is considered as being representative of the whole group of variables;
- they may be easily manipulated if no control is conducted in the way ratios are calculated;
- they may lack insufficient criticism with regard to the validity and comparability of ratio's.

To overcome these limitations, quantitative performance measures should meet the following requirements (Benz (1976) p. 3):

- the information itself on which the ratios are based, must be reliable and valid;
- the basis-information should have the same terms of reference (e.g. should relate to the activities within one purchasing department);
- ratios are situation-specific and therefore should be considered in their time-perspective;
- a change in value of a ratio can be only ascribed to a factor, if all other factors have remained the same or if external influences can be eliminated.

.Ratios and indices can be classified into several categories. A common classification is:

1. Actual-to-Plan ratios: in these kinds of ratios actual data pertaining to price, quality, delivery, etc. is related to planned performance, which may be based upon:
   - historical data
   - historical data plus a budgeted increase/decrease
   - target forecast (generally used for new items);

   favorable or unfavorable variances are used as a measure of purchasing effectiveness.

2. Actual-to-Market ratios: these ratios are used to provide information about the relationship of actual data to published market data; usually the data relate to purchasing prices and delivery lead-times. Due to its character it will be clear that this kind of ratios can only be used for a limited amount of purchasing data.

3. Time-comparison: these ratios relate actual data to historical data: they are retrospective and may be used to identify improvements or deteriorations in purchasing performance.

4. Inter-company comparison: ratios may also be used to compare purchasing activities with those of other locations and/or companies. However, it will be clear that this should be done very carefully since different purchasing locations will have different tasks and responsibilities.

Summarizing this paragraph we may conclude that purchasing ratios and indices serve primarily, in our opinion, as indicators or "warning-signals". If variances between standards and actual data are found, further research will be needed in determining their cause. In this respect they trigger management's attention: they assist him in where to put the emphasis and where to pay attention. They help to make purchasing activities more visible.
In the remainder of this paragraph purchasing performance ratios have been divided into the following groups:
- price performance ratios
- quality performance ratios
- delivery performance ratios

Each group is discussed in more detail below.

5.4.2. Price performance ratios

Price performance measures cannot be considered separately from purchasing materials budgets (see section 5.2. of this chapter). Usually they have the character of the four kinds of ratios, as described in the previous section. Monczka cs. ((1979), p. 48) mention the following measures, which were used at 18 large American organizations to monitor purchasing prices:

- actual purchase price versus planned purchase price comparisons;
- actual purchase price(s) compared with a market-index;
- comparisons of actual-to-actual purchase prices for individual and aggregated items between operating plants or divisions within an organization.

The first type appeared to be used most frequently. They were used on the overall purchasing materials budget level as well as on the line-item level.

Indices, used to monitor purchasing prices may, in general, have two different forms:

- Single indices, which relate actual purchase prices to published market prices. These are mostly used for raw materials, which are bought in commodity markets (such as copper, tin, steel, wheat, cotton, cocoa etc.);
- Composite indices, which are made up out of indices for several major commodities. If a company manufactures a wide variety of products it cannot afford to keep cost-indexes for each product being purchased. In such cases it may be wise to construct an index based on the major composites of the end-product (see for an illustration Exhibit 5.2.). In some companies this type of index is also used to measure price- effectiveness in MRO-buying (4).

Component Group	Percent Weight	January		February		March	
		Index	Extension	Index	Extens.	Index	Extension
Electrical	35	100.00	35.00	102.00	35.70	101.00	35.35
Castings	20	100.00	20.00	90.00	18.00	90.00	18.00
Bearings	5	100.00	5.00	100.00	5.00	99.00	5.95
Hydraulic	15	100.00	15.00	96.00	14.40	97.00	14.55
Micellaneous	25	100.00	25.00	100.00	25.00	94.00	23.50
Composite Index			100.00		98.10		96.35

Exhibit 5.2.:

Composite Index of materials costs (Source: Ammer (1980) p. 233).

Price-indices may have limitations in terms of costs; often a lot of information is needed to compile them and to keep them up to date. However, they may have several advantages (Ammer (1980), p. 235):

- they permit more accurate forecasts of costs;
- comparison of actual key part prices with projected prices or with general price indices indicates how well purchasing personnel have done their work and may stimulate improvement;
- price indices help to make the materials management job easier, since they summarize the effects of thousands of material transactions.

Other measures found in literature and practice (5) include the ratio of current purchase prices to an industrial engineering estimated price for the purchased items making up the final product and the actual purchase content of finished products.

Observing the contributions in purchasing literature on price performance measurement and evaluation it can be concluded that most of them are rather vague and general. Opinions differ with regard to how to evaluate purchasing price performance. One view holds that prices paid primarily should be compared with historical price data (Ammer, 1980). In comparing actual prices with previous prices paid, trends will appear which can be used to anticipate further problems.
Another view holds that for purchasing price performance evaluation standard costs should be used. Heinritz and Farrell ((1972), p. 424) propose standard costs a the prime standard of measurement (6). Most authors propose several

ratios and measures, which can be used to assess prices paid. However, no differentiation with regard to their use is presented. Therefore their recommendations are rather vague.

5.4.3. Quality performance ratios

Since the purchasing function has the prime responsibility in selecting the vendor, it has also the responsibility for assuring the quality of goods as supplied by suppliers. Therefore the quality of goods supplied should be regularly assessed. In most cases this is done by analyzing the records of the company's receiving inspection reports.
Since quality-assessment lends itself easily to quantification, several measures are used in this area. They can be broadly divided into ratios and quality-indices:

- Ratios often refer to the number of rejected orders as a percentage of total shipments received from each supplier for each basic type of material.
  Examples of this type of measures are:
  - number counts - units, shipments or dollars accepted/rejected per unit of time
  - percentages - percentages of units, shipments, or dollars accepted/rejected against total received per unit of time.
- Quality indices: these may be expressed as:
  - Quality Cost Index (QCI): an index of the total dollars (price plus cost of quality problems) required to obtain one dollar's worth of acceptable purchased items from a certain applier. Such an index usually is expressed as follows:

    $$QCI = \frac{\text{total purchase value/item + quality problem costs/item}}{\text{total purchase value/item}}$$

  - Quality Performance Index (QPI): a measure of the number of lots rejected against the number of lots received, adjusted by the severity of the quality-problems for each vendor per time period. Such an index may be calculated as illustrated in Exhibit 5.3.

Quality-Inspection Result	Decision	Penalty Points
Reject	Return to Vendor	100
Reject	Rework to avoid production delays	100
Accept	Some minor defects, but product can be used for production	50
Approval	According to specification	0

The quality-performance index (QPI) is calculated as follows:

$$QPI = 100 - \frac{\text{total number penalty points}}{\text{total number of shipments}}$$

Example:

in period t 21 shipments were received: After inspection 2 were accepted and 3 were rejected. Penalty points were calculated as follows:

- 16 shipments approved = 16 x 0 = 0 penalty points
- 2 shipments accepted = 2 x 50 = 100 penalty points
- 3 shipments rejected = 3 x 100 = 300 penalty points

21 shipments — 400 penalty points

$$QPI = 100 - \frac{400}{21} \times 10 = \text{ca. } 80$$

Exhibit 5.3.:
Calculating A Quality Performance Index: An Example (Source: adapted from Van Eck and De Weerd, 1980).

The QPI may be calculated per commodity-group, per line-item, per supplier or per buyer.

Another measure, which is of a more qualitative nature, is to tabulate the number of quality problems (which are classified into several groups) and to rate these, according to the type and severity of the quality problem, which occurred.

Quality measures are generally used to assess supplier- performance in a more objective way. Sometimes they are used to help improve supplier performance as well as to justify a decision to skip a supplier, who has not performed adequately. Furthermore trends in quality problems with a certain vendor and the specifics of these problems may be identified and visualized. These ratings can be communicated to the vendors and may in this way provide a basis for negotiations on quality improvements.
Of course these ratio's have some limitations. However, because these are similar to the limitations as discussed in the introduction to this paragraph, they are not further discussed here.

An important thing in assessing the quality of incoming materials (or the lack of it) is to identify how severe production and products are affected by the inadequate quality of supplies. In the methods presented above, this has been covered by introducing a penalty points system. Of course, this system may work under some circumstances, but in some cases a more precise ramification of how production is affected may be necessary. This ramification may be made in terms of costs, caused by bad quality. It seems logical that a supplier in such cases carries all costs incurred by bad quality. These costs may include costs of rework and repair, but may also contain the costs of consequential damage (such as production interruptions, etc.).
It is debatable as to what extent consequential damage can be charged to the supplier. However, although this subject is largely of a matter of jurisdiction (and therefore beyond the scope of this study) it is mentioned here as an important tool to monitor and manage supplier- relations. It is therefore, surprising, that discussion of quality costs as a measure of purchasing performance evaluation is limited. Only Stevens (1978) and Kudrna (1972) (1972a) touch on this subject. During his research Stevens (p. 61) describes a manufacturer who consistently kept quality records for his major suppliers (see Exhibit 5.4.). These records were based on all costs relevant to obtaining the right quality from these vendors.

	Last year	This year	Current additions	Total year to date
Material Quality Costs . qualifying visits . laboratory tests . incoming inspection . processing inspection reports . manufacturing losses . handling and packing rejections . complaints . spoilage and waste				
TOTAL	3590	1455	20	1475
total value purchases	87.500	66.000	1.000	67.000
quality cost-ratio	4.1%	2.2%	2.0%	2.2%

Exhibit 5.4.:
Quality cost reports on incoming materials (source: Stevens (1978), p. 62)

By relating total quality costs to total purchased value, a quality cost ratio resulted which was used to monitor the supplier-performance in this respect. Kudrna suggests the use of claims made for defective materials. His approach differs somewhat from the one, as presented by Stevens: not all costs incurred by such materials can usually be regained from the supplier. Kudrna suggest two ratios for monitoring supplier-performance on quality:

$$\frac{\text{claims in dollars per period}}{\text{purchases in dollars per period}} \qquad \frac{\text{claims collected in dollars per period}}{\text{claims in dollars per period}}$$

It may be concluded that the discussion on evaluating the quality performance of the purchasing function in purchasing literature is limited to, as we refer to it, the post-design stage; it is primarily related to assessing quality of

products for which specifications have been determined. However, it can be argued that large savings can be gained by suggesting alternative specifications and/or materials in the predesign-stage; in this stage the purchasing function may have an important role. This is recognized by many authors, when they discuss purchasing's role in value engineering. However, they fail to recognize the implications of this to purchasing performance assessment. We think that purchasing's involvement in the predesign-stage of the company's product-development policies should be an important consideration when assessing the effectiveness and efficiency of this function.

5.4.4. Delivery-performance ratio's

Delivery-performance measures can be classified in two types:

- time-related measures: these in most cases are calculated by comparing the date when a shipment is actually received with the date for which it was promised;
- quantity-related measures: these are calculated by comparing the quantity actually delivered with the quantity ordered.

These measures are primarily used to monitor and keep control of the flow of incoming materials. In many cases the responsibility for this incoming flow in most companies cannot solely be ascribed to the purchasing department. In some companies a separate materials group or the production and/or inventory control department may be responsible for controlling the flow of materials from suppliers to the requisitioners.
Variances between quantities ordered and quantities delivered can be easily identified in general. However, a problem may occur if an order is delivered in several lots. In that case it is important to keep track of the total volume delivered, which usually requires some paperwork. Another problem is to define exactly when an order is considered to be delivered. To what extent are deviances from quantities ordered allowed? How are overshipments appreciated? These questions should be answered in order to prevent interpretation problems in supplier-delivery performance evaluation.
With regard to time-related measures several alternatives may exist to identify whether or not a vendor has fulfilled his obligations. As standards may serve in this respect (Monczka c.s. (1979) p. 219):

- the vendor promised delivery date;

- the production scheduling due date;
- the purchase order shipdate plus transit time;
- the total of requisition date, the purchasing administrative lead time, the vendor lead time and the transit time.

Choosing a standard for evaluating delivery performance evaluation appears to be a major problem due to:

- different definitions of what is meant by delivery-time; some companies include transit time, purchasing administrative leadtime, etc., whereas others do not;
- built-in "slack" in requisition-dates; purchasing planning want their materials usually faster than they are needed;
- built-in "slack" in delivery-dates: buyers may add one or two weeks (depending on the type of product) to the supplier delivery-time, since they expect the vendor not to keep his promise; many suppliers tend to be over-optimistic on this point.

Choosing on what date the supplier will be expedited is crucial. If expediting is based on production scheduled date, late delivery by the supplier will directly lead to production problems. However, if materials ordered are expedited on shipdate from the vendor, some emergency-measures (such as air-transportation) may deliver the product right on time.

How is vendor delivery performance measured? Some authors propose a combined delivery performance rating (Ammer (1980), p. 622). This rating may be calculated by averaging the time delivery rating, weighted by e.g. 70%, and the quantity delivered rating weighted by e.g. 30%. Other authors (such as Bailey and Farmer (1981), Zenz (1981) suggest separate indices. Most authors, however, do not differentiate between quantity- and time-related measures. They only refer to the latter ones, when discussing delivery performance evaluation.

Delivery performance measures appear to be primarily used for (Monczka (1979), p. 228, Ammer (1980), Van Weele (1981)):

- tracking history of parts received;
- identifying current problems with suppliers, commodities and so forth;
- monitoring supplier delivery performance for trends, that is early/late deliveries;
- identifying where action plans are needed to overcome problems;

- using in supplier negotiations;
- improving vendor relations.

However, apart from the general limitations, which are involved in using ratios for evaluating purposes, some specific problems with regard to interpreting delivery performance measures should be mentioned:

- If required dates are changed by the requisitioner, how is vendor delivery performance then appreciated?
- How are the consequences of due delivery dates appreciated? How bad is a variance from promised date affecting the company's own production schedule?

These questions hamper an accurate measurement of delivery performance. However, its prime value lies in the fact that they identify strengths and weaknesses in supplier delivery schedules. For this reason Leenders c.s. ((1980), p 229) suggest an evaluating system of a more qualitative nature; depending on their performance suppliers get a "top", "good", "fair" or "unsatisfactory" rate.

5.5. Purchasing Flowcharts and Reports

In reporting on purchasing performance, some authors differentiate between flowcharts and reports.

Flowcharts are used in general to visualise the administrative workflow of the purchasing function. More specifically, they may serve the following purposes (Monczka c.s., (1979), p. 177):

- identification of open purchase orders and their due dates;
- identification of past-due open orders i.e. orders for which the current date was later than the need-date or promise-date and for which materials have not been received;
- identification of materials orders needed immediately by manufacturing (i.e. a "hotlist");
- measurement of how well the purchasing function, buyers and suppliers are doing in meeting delivery dates.

A major function of these flowcharts is that they enable us to identify bottlenecks in the purchasing administrative process. By following the purchasing workflow it can be identified as to what extent rush-orders occur due to late requisitions, too long purchasing administrative leadtime or vendor

delivery failures. This information, therefore, can be used to improve purchasing administrative procedures and communication with other departments.
By identifying "weak spots" in the administrative process, flowcharts may visualize the needs for automatization in this area. In the circumstances, that the administrative workflow already has been partially computerized, these reports may suggest further improvement and refinements in the computer-programs, currently being used.

Reports on the purchasing administrative workflow may have various forms and refer to different matters. Examples are:

- open requisitions-report
- purchasing requests for outstanding quotations
- open purchase order reports
- outstanding purchasing orders, which have not been confirmed by supplier
- weekly/monthly listing of overdue orders
- percentage listing of overdue orders
- promised vendor deliveries by week
- past-due performance on a monthly basis (by buyer/by supplier)
- number of order-changes as
  . initiated by vendor
  . initiated by purchasing
- dollar value of open purchase orders
- etc.

Sometimes a distinction is made between delinquent and critical past due orders. A delinquent past due order refers to a delivery for which the current data was beyond the latest vendor promise date. It indicates that the supplier was not performing up to this promise, but this did not necessarily indicate a problem for manufacturing. A critical past due order is one for which the latest vendor promise date was later than the need date as specified by manufacturing. These orders, thus, require immediate action by the buyer. As we will see later in this study (see Chapter Seven) this differentiation can be used in developing specific expediting policies for suppliers of critical purchase-items.
A problem with interpreting material-flow reports is that these usually do not explain why certain delivery problems occurred. They may have been caused by internal factors (such as late requisitioning by production planning, inadequate purchasing administrative leadtime) as well as by external factors (such as

vendor-failure to keep to his promises). For this reason, these kinds of reports should be accompanied by some verbal explanations.

5.6. The purchasing audit

One of the most fundamental and therefore time consuming techniques in assessing purchasing departmental effectivenes and efficiency is the purchasing audit. This method is particularly concerned with the functioning of the purchasing department i.e. the internal consistency and congruency of purchasing policies and procedures with the overall operations of the company. The purchasing audit can provide management with an objective view on purchasing policies and procedures. Furthermore, it may provide insight into the extent to which the purchasing function is integrated with other material related functions.
Generally a distinction can be made between three different types of purchasing audits (Zenz (1981), p. 357):

- The accountant's audit: this audit is designed to assure that the purchasing function follows those procedures and controls, which are generally accepted by the accounting profession in formulating certifiable financial statements and reports;
- the internal audit: which is designed to evaluate specific job descriptions and employee performance within the purchasing department;
- the management audit: this audit evaluates the integration of the department to the total corporate organization and its goals.

Audits can also be differentiated according to the areas, in which they are applied, such as: departmental organization, departmental policies and procedures, interdepartmental relationships, prices paid for purchased materials, vendor- performance and inventory control. Exhibit 5.5. provides a list of items, which could be covered in a purchasing audit.
Since this assessment should be made in an objective way, it is generally recommended (see Zenz (1981), p. 357, Ammer (1980), p. 361 and Leenders c.s. (1980), p. 550) that the audit is performed by someone outside the purchasing department.
It is noted here that conducting an audit provides only a "instant- picture" at one specific moment in time. Its value for purposes of evaluation will be greatly enhanced if it is repeated over time.

Although Hayes and Renard (1962), p. 44), found that purchasing audits were used most as techniques for evaluating purchasing performance (7), these findings have not been verified by later studies.
In his study Stevens (1978), p. 72) found that audits ranked only 15th out of 18 evaluation methods being used to assess purchasing activities. Only 22.9% of the companies, which have been investigated in this study, seemed to use this technique.
However, when only American subsidiaries were considered, this figure rose to 53.0%. It can therefore be concluded that this technique is relatively used more often in American based companies.
In their recent study among 18 large American organizations (industrial as well as governmental) Monczka, Carter and Hoagland ((1978), p. 28) found that purchasing audits were used in only eight of them. Since their sample includes only organizations, which are considered to be leading in the field of purchasing management this finding is remarkable.
What are the underlying reasons for the different outcomes of these studies and for the fact that purchasing audits (at least in the UK) are little used? Our answers can only be tentative, since they could not be derived from research reports or other literature.

The differences in outcome may be explained by the fact that the three studies discussed were conducted in a different period (1964 versus 1978/1979) and cultural setting (United States versus United Kingdom). Moreover definitions, about what a purchasing audit is and what it should cover when used in practice, could have been different in the various studies. Given the present literature there is no common opinion on this. Therefore it is not surprising that these studies lead to different outcomes. A final factor may relate, of course, to the differences in research, methodology applied and the accuracy with which it was conducted.

Although we have no quantitative data to support this, it is our impression that also in The Netherlands the purchasing audit, at least at medium sized and smaller companies is little practiced. Interviews with purchasing executives suggest the following reasons for this:

Purchasing Organization

- intradepartmental relations
- interdepartmental relations

Purchasing Policies regarding

- altering specifications or requisitions
- investigating approving and selecting vendors
- procedures for obtaining bids
- procedures for awarding contracts
- policies relating to conflict of interest, gifts and entertainment

Purchasing Procedures

- purchasing requisitions
- purchase-order control
- vendor investigation
- transportation and price
- discounts
- adjustments
- make-or-buy
- surplus sale
- off-plant inventory
- petty-cash purchases
- receipt procedures
- vendor payment
- purchasing ethics

Purchasing Evaluation and Reporting

- evaluation of purchasing personnel
- evaluation against clearly established goals
- frequency of reporting

Exhibit 5.5.:
Areas to be covered by a purchasing audit (source: adapted from Zenz (1981)).

- although it is often stressed that a purchasing audit should not be considered as an "evaluative tool" (Hayes and Renard (1981), p. 43) or as a "fault-finding session" (Pooler (1964), p. 237) it often seems to be

perceived as one. Auditing reports, as submitted to higher management seldom reflect the underlying reasons for deviations from rules; this facilitates a wrong interpretation by higher management of these reports;
- since higher management often has no direct experience in the purchasing field, problems in this area are not adequately recognized. Moreover, it may lead to overoptimism of purchasing's room for improvement;
- in most cases purchasing audits are being conducted by people who have a totally different background and experience than the people, who actually do the buying. Audits are mostly being performed by accountants who are mainly concerned with checking for such things as assurance that proper signatures and approvals were on purchase orders, and that materials received correspond to materials billed. Due to its character the purchasing audit focuses primarily on efficiency rather than on effectiveness of the purchasing department;
- an important, but less fundamental argument is further that a purchasing audit requires a lot of time, which increases the workload of the purchasing manager.

In summarizing, it is our impression that the purchasing audit is often perceived as a "nuisance", which is necessary to satisfy higher management. The intention, that a purchasing audit should be conducted in order to help the purchasing manager improve his policies and procedures, is often not met in practice.

Finally a creative approach towards the assessment of purchasing's effectiveness and efficiency should be mentioned. In some companies suppliers are regularly asked about their experience with the purchasing department. This method, however, appeared to be little used in practice. In their study Bird and Mazze (1976) found that only three of the 54 purchasing managers who were interviewed, reported that their firm did use a formal vendor evaluation of purchasing's performance. This seems unfortunate to us, since vendors could be one of the best evaluative sources for purchasing management, due to their many contracts with customers in the market.

5.7. Some Concluding Observations

Although many comments can be given on the methods, that have been described, we will confine these to some general observations at the end of this chapter:

1. Having gone through the literature, it can be concluded that the discussion on purchasing performance measurement is rather descriptive. Most authors describe several ratio's and measures which can be used to assess purchasing activities. This is in our opinion a major problem, because most of the measures described can only be applied in very specific situations.

2. A further observation is that the issues covered on the subject of purchasing evaluation in major purchasing textbooks are not very original. Most authors tell the same story.
   When the latest editions of these books are considered, the subject of purchasing performance evaluation is discussed in a similar way to earlier editions. In some books the subject only takes a few pages! This is unfortunate since this subject is, as has been demonstrated earlier, an essential part of the purchasing management process.

3. A conclusion may be that the literature on purchasing performance evaluation reflects only to a limited extent concepts that have been developed in management control theory. To be specific: with exception of management by objectives, which is (although poorly) discussed by most authors, little attention is given to subjects such as the place of purchasing performance evaluation in the purchasing-management process, its implications for human behaviour, prerequisites for effective control of purchasing activities, etc.

4. The approach to purchasing performance evaluation can be considered as instrumental rather than behavioral. Usually some techniques are being described, however their implications for motivation, communication, and integration with other functional areas remain untouched. Furthermore the discussion in literature does not reflect how these techniques relate to departmental effectiveness and efficiency.

5. Most techniques and measures, as presented, are after-the-fact, i.e. they relate to historical events and/or activities performed in the past. This is unfortunate since purchasing management is primarily future oriented i.e. it does not want to know how it performed in the past; it is more interested in how it should (or could) perform in the future. For this reason we feel that purchasing performance evaluation primarily should focus on providing answer to the following questions:

- where do we stand with our present purchasing function (i.e. how did we perform against our targets?)
- where are we going with our present purchasing function (i.e. what are our targets going to be?)

In answering these questions we agree with Arnolds, Heege and Tussing (1980) that measures should be used which allow comparison of actual results with planned data.

6. Having reviewed literature, it is our conclusion that important subjects such as cost-reduction planning and the purchasing audit receive only limited interest. This is unfortunate, since experiences with some major Dutch manufacturing companies have shown that in business much interest for these subjects exists.

7. Most comments on benefits and limitations on performance evaluation methods are stated from a scientific point of view. Most comments concern the validity accuracy and reliability of the measures used. However, in our opinion this evaluation cannot be provided without knowing the intended use of these techniques. Measures and techniques should be commented on from a managerial point of view. The question is not if the measures used are accurate enough but rather whether they are adequate for their intended use.

Notes to Chapter Five

1. See on this subject Bailey (1978), p. 295 and Schroons (1982); during our research we found similar practices at some Dutch and American companies. (See Van Weele (1981) and Faes, de Rijcke and Van Weele (1982)).

2. See for example Heinritz and Farrell (1972), p. 345-346, Hartwell (1973), p. 6-7, Bailey (1978), p. 293, Zenz (1981), p. 349.

3. Adapted from the general guidelines for budgetting as suggested by Blox, Van der Enden and Van der Hart (1982), p. 240.

4. See our study on the purchasing practices of 10 leading American companies as reported by Faes, de Rijcke and Van Weele (1982).

5. See Bailey (1978), Monczka, Carter and Hoagland (1979), Van Eck and De Weerd (1980) and Faes, De Rijcke and Van Weele (1982).

6. See for more details of the ideas of Heinritz and Farrell also Chapter Four of this study.

7. In their study internal and external audits ranked first and fourth respectively out of fourteen methods being used to evaluate purchasing performance; see for more details Chapter Four of this study.

CHAPTER SIX: PURCHASING PERFORMANCE MEASUREMENT AND EVALUATION: AN EMPIRICAL SURVEY AMONG DUTCH COMPANIES

6.1. Introduction

This Chapter describes the results of the empirical research that we conducted for this study. This empirical research consists of two surveys. The first survey, from 1980, was conducted in order to describe what methods and techniques were used by some industrial companies in The Netherlands to measure and evaluate purchasing activities.
The objective of the second survey, conducted in 1982, was to provide more details regarding the use of some important purchasing performance measures, which appeared to be frequently used in industrial practice.

Both surveys have been limited to industrial manufacturing companies. Trading companies, retailers and governmental institutions have not been included since their purchasing activities were felt to be too different in character to enable comparison.

In this Chapter we will focus primarily on describing the results of the first survey. Where appropriate we will report our findings from the second survey. Details of both surveys can be found in earlier publications (1).

6.2. Research Methodology

The objectives of the first survey, which was conducted in 1980, were:

- to describe methods and techniques as used by industrial companies in The Netherlands to measure and evaluate purchasing operations;
- to identify problems, which are related to the applications of these techniques and to identify what opinions exist with regard to their benefits and limitations;
- to develop some managerial guidelines and/or recommendations to measure and evaluate industrial purchasing activities.

Our survey has been primarily qualitative in scope. The results, thus, are not generalizable for Dutch industry as a whole.
Due to the scope of the survey, and the available resources, we decided to include 50 companies in the survey. Assuming a non-response rate of 66.6%, approximately 150 companies were selected for participation; in fact, 49 of these have been recommended by the Dutch Association for Purchasing Management. Another 99 companies have been randomly selected from Dunn and Bradstreet's data sources (2). Due to the sampling procedure 148 companies were invited to participate in the survey.

In selecting the companies a distinction was made between large (often multinational), medium sized and small companies. The reason for this was that the techniques, used to measure purchasing performance, were assumed to relate to company size. Small companies seem to be more flexible due to their often more informal structure of communications. Therefore purchasing activities were assumed to be measured here in a different way than in large companies.

The three classes of companies were characterized as follows:

- large companies: those companies with more than 500 employees;
- medium-sized companies: those companies which employ between 200 and 500 people;
- small companies: those companies having between 100 and 200 people employed.

Companies with less than 100 employees were not included, since these usually do not have a separate purchasing department. A short informal survey confirmed this assumption.

Data gathering was conducted as follows. First, the 148 selected companies were asked to participate in the research; 86 of them approved, which was considered as quite a satisfactory response (59%).
Three questionnaires were sent to these 86 companies. One questionnaire had to be answered by the executive in charge of the purchasing department. This one contained questions of a more general nature (such as scope and responsibilities of the purchasing organizations, size, and reporting relationships).
The other questionnaires had to be answered by two purchasing agents. These questionnaires contained questions specifically focused on the products for which they were responsible. By comparing both types of questionnaires some

insight had to be gained about the reliability of the answers provided. The objective of this stage of the research was to get a first insight into the methods and indicators, which were used by the specific companies to measure and evaluate purchasing performance.
The questionnaires were analyzed and the most interesting companies were selected for indepth-interviews. It was felt that a good understanding of the problems and limitations, involved with the various techniques, could only be acquired by a personal interview with the respondents. A selection of these companies was based on the following criteria:

- size
- complexity/characteristics of purchasing operations (derived from number of suppliers, number of purchasing codenumbers, etc.)
- purchasing turnover ratio (purchase-value expressed as a percentage over sales)
- number of buyers employed
- degree of formalization of purchasing procedures
- existence of a purchasing materials budget
- the answers provided to the questions related to cost-effectiveness, delivery-reliability, quality assurance and departmental effectiveness.

If a company met these criteria, it was selected for personal interviews. All these companies complied with our request. Twentythree companies were selected and 52 people were interviewed. A checklist was used in order to serve as a common base for all interviews, which were conducted.
In all companies the survey results have been discussed with the manager in charge of the purchasing department and at least with one buyer. In some cases two buyers have been interviewed. In two companies no buyers could be interviewed.
Unfortunately only 72 of the 86 companies that promised their cooperation, could be used for analysis. Four companies did not return their questionnaires (even after sending them a reminder); 5 companies were not able to answer the questions, whereas the other five only answered the questions partially.
The remaining questionnaires were analysed, using the SPSS-program (2) at Nijenrode, Graduate School of Business. Frequency- and crosstabs were made to analyse various relationships. Finally all interviews have been reported according to a similar structure. This posed some problems, since some subjects appeared to have been discussed more in detail than others. Furthermore variations appeared to exist in the interviews conducted regarding depth and issues covered. In some

instances issues were not covered at all since they were not present at a specific company. For these reasons no attempt has been made to quantify the responses as collected during the personal interviews.

In analyzing the research data, various cross-tabulations have been made. The five groups of performance measures, that have been identified (see paragraph 6.6.1.), have been related to a variety of independent variables such as company size, purchasing's share in company sales, purchasing departmental size, purchasing reporting relationships and production technology.

In this Chapter we have limited our analysis primarily to cross-tabulations , having company size as independent variable.

In paragraph 6.6.7. we present our findings based on the relationships between performance measures and other independent variables.

Cross- tabulations have been made using the Statistical Package for the Social Sciences (SPSS) at Nijenrode, the Netherlands School of Business and at Eindhoven University of Technology.

Statistical relationships have been measured by using the Chi Square Test (X^2). When relationships were found statistically significant at the 0.05-level, these have been indicated with an asterisk (*).

We are aware that the Chi Square Test may be used only, when each cell has a minimum of 5 observations. Where we did not attain this number, classes of variables have been redefined.

In every case details may be found in Appendix 2 to this Chapter.

In the remainder of this Chapter we will focus first on analyzing the companies, that participated in our survey. Then, some explanation is given concerning the guidelines and procedures used in purchasing and the actual use of budgets in purchasing. Finally, the various measures that have been identified, will be analyzed.

6.3. Analyzing the Response

As can be seen from Table 6.1., larger companies in general responded better to our request for participation than the smaller companies. Companies, that did not cooperate, stated as reason: lack of interest, lack of time, lack of reliable data (3). Smaller companies reported relatively more frequently that they did not have any formal purchasing evaluation procedure; for this reason they considered participation in the survey not useful.

From this it may be concluded that the more advanced purchasing departments of smaller companies are represented in our sample.

Table 6.1 Response Rates per Company Category

Size / Participation?	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
Yes	30	55.6%	26	51.0%	16	37.2%	72	48.6%
No	24	44.4%	25	49.0%	27	62.8%	76	51.4%
Total	54	100%	51	100%	43	100%	148	100%

Table 6.2. sheds some light on the relative importance of purchasing for the companies, that were involved in our survey. From this table it can be calculated that 48 companies (or 66%) had a purchasing turnover-ratio of more than 40%. The average for the sample of companies was 47.2%.

Table 6.2.: Purchasing share in company sales

Purchasing's share in company sales / Company Size	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
1. ≤ 10%	2	7%	-	-	-	-	2	3%
2. 11 - 20%	2	7%	-	-	-	-	2	3%
3. 21 - 30%	4	13%	3	12%	1	6%	8	11%
4. 31 - 40%	4	13%	4	15%	4	25%	12	17%
5. 41 - 50%	4	17%	6	23%	3	19%	13	18%
6. 51 - 60%	8	23%	2	8%	5	31%	15	21%
7. 61 - 70%	5	17%	7	27%	3	19%	15	21%
8. 71 - 80%	1	3%	3	12%	-	-	4	5%
9. >80%	-	--	1	3%	-	-	1	1%
Number of companies	30	100%	26	100%	16	100%	72	100%

Purchasing performance evaluation, as we have seen in previous chapters, will differ depending on the scope of the purchasing function i.e. the objectives and responsibilities as assigned to the purchasing department. That companies differ in this respect, is demonstrated by Table 6.3.

Table 6.3.: Purchasing Responsibilities related to company size

Purchasing Responsibilities \ Company Size	Large		Medium		Small		Total		
	abs	%	abs	%	abs	%	abs	%	Rank
- Inventory Control	16	53%	11	42%	11	69%	38	53%	1
- Incoming Inspection	4	13%	6	23%	4	25%	14	19%	3/5
- Materials Handling	3	10%	6	23%	5	31%	14	19%	3/5
- Quality Control	4	13%	5	19%	3	19%	12	17%	6
- Handling Complaints	8	27%	2	8%	-	-	10	14%	7
- Transportation	8	27%	6	23%	4	25%	18	25%	2
- Handling Invoices	3	10%	3	12%	2	13%	8	11%	8
- Other	7	23%	3	12%	4	25%	14	19%	3/5
Number of companies	30		26		16		72		
Average number of responsibilities mentioned	1.8		1.65		2.06		1.77		

From this table it can be concluded that purchasing activities in smaller companies are somewhat more diverse than in large companies. Smaller companies reported on average a larger number responsibilities (2.06) than larger companies (1.80) (4). As can be seen from Table 6.3 the purchasing department in smaller companies is more often responsible for:

- inventory control
- incoming inspection
- materials handling
- quality control
- handling invoices.

However, with the exception of the last responsibility, relationships with company size are weak and not significant.

The fact that none of the smaller companies responded on handling complaints is remarkable. This may be due to the fact that the question concerning this issue has not been adequately understood by respondents.

To what extent did companies differ with regard to the complexity of the purchased materials range? This question may be relevant since it may be assumed that companies need better i.e. more advanced purchasing control systems, when the incoming material flow is more complex. Table 6.4. provides some insight as to the number of different items purchased per company-category.

Table 6.4.: Purchased Materials Assortment.Related to Company Size.

Number of different items purchased * \ Company Size	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
<2500	2	7%	7	27%	5	31%	14	19%
2500 - 5000	3	10%	6	23%	2	13%	11	15%
5000 - 10.000	8	27%	10	38%	7	44%	25	35%
10.000 - 20.000	10	33%	3	12%	2	13%	15	21%
20.000 - 30.000	3	10%	-	-	-	-	3	4%
30.000 - 50.000	1	3%	-	-	-	-	1	1%
50.000 - 80.000	-	-	-	-	-	-	-	-
>80.000	3	10%	-	-	-	-	3	4%
Total	30	100%	26	100%	16	100%	72	100%

From this Table it can be concluded that there is a significant relationship between purchased materials assortment and company size (see Appendix 2.). Most participating companies have between 5000 and 10.000 different purchasing items to handle.

Table 6.5. shows the reporting relationships of the purchasing departments within the participating companies.

Table 6.5.: Purchasing Reporting Relationships

Purchasing reporting to \ Company Size	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
Production manager	1	3%	1	4%	1	6%	3	4%
Materials manager	7	23%	3	12%	-	-	10	14%
General manager	8	27%	19	72%	10	63%	37	51%
Purchasing director	1	3%	-	-	1	6%	2	3%
Other	13	43%	3	12%	4	25%	21	30%
Total	30	100%	26	100%	16	100%	72	100%

Apparently there is little common opinion about where purchasing should be located within industrial companies. In 51% of the cases purchasing reports directly to the general manager, but this is largely due to the relative high

figure for small companies. In large companies purchasing is more likely to report to the materials manager; this function apparently does not exist at smaller companies.

Our interviews with purchasing managers did not reveal a specific rationale for the location of purchasing within the organization.
From our interviews it appeared that the position of purchasing in general was based upon different considerations:

- historical grounds: purchasing reported to a specific manager "since this always had been the case";
- political considerations e.g. in one case purchasing reported to the financial manager and not the the Production Manager; in this specific company it was thought that the latter was too much product-oriented and would stress quality irrespective of cost-considerations;
- personal reasons e.g. in another company one was aware that purchasing was located at the "wrong" place i.e. reported to the "wrong" manager; however, he was shortly to retire and after that purchasing would report to the materials manager.

The category "other" included Plant-Manager, the Manager Technical Operations, and the Financial Manager.

In 14% of the companies purchasing reported to the materials manager. In 5 other companies plans existed to integrate the materials related areas into a materials management organization under one heading. However, whereas in some of these companies purchasing was included, in others it remained a separate responsibility area. Clearly there was no general agreement among companies as to what should be included in materials management, a finding, which is congruent with other research findings (Miller and Gilmour, (1979)). In an USA-survey, which was conducted in 1980 (Miller, Gilmour and Van Dierdonck) reporting relationships of purchasing were investigated. In a sample of 137 companies, purchasing reported in 23.4% to the general manager (our results 50%), in 26.6% to the production manager (ours 8%) and in 19.7% to the materials manager (ours 15%). That we found 50% reporting to the general manager, may be due to the fact that we included also small companies in our research. These were not included in the USA-study.

Another factor which may be of interest when measuring purchasing performance is size of the purchasing department. It may be assumed that the larger the purchasing organization, the greater the need for formal evaluation methods.

Table 6.6. relates purchasing staff to company size. As can be seen from this Table purchasing staff in large companies may differ largely in size. Furthermore there is a clear relationship between both variables (X^2 = 41.38601; significance 0.0002).

Interpretation of these data, however, is difficult due to the following factors.

- these figures do not reflect the degree of centralization (or coordination) in purchasing; this issue is especially important for multiplant companies, where often some coordination exists between the various purchasing locations; comparing purchasing data from these companies is hampered by the fact that
  - . decentralized buying units may buy for other units; this appeared to be true for 64% of the companies
  - . other units within the company, such as the Central Purchasing Department, may contract specific items for the decentralized locations (on this subject no quantitative data were obtained)
- these figures do not provide information on the characteristics of the product-assortment; buying customer specified products (such as casting and specific molds) requires more effort (and more personnel) than buying standard products (such as MRO-supplies).

Our survey indicates that purchasing activities for the majority of the companies were not limited to the own plant/operating unit. However, they do not indicate to what extent purchasing activities were coordinated. Our interviews revealed that this varied from buying one or several productgroups for another plant to buying all production material requirements for an operating unit.

In our opinion the centralization-decentralization issue is a very important one, when conducting research in the purchasing area. As it appeared purchasing activities for those companies which belong to a larger group, are difficult to isolate. As a consequence, comparison of quantitative data (such as number of

buyers versus total employees, purchasing turnover versus sales turnover, etc) should be made very carefully.

Table 6.6.: Purchasing Staff Related to Company Size (5)

Purchasing Staff (Number of people) \ Company Size	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
<2	-	-	1	4%	3	20%	4	6%
2 - 5	4	13%	17	65%	11	73%	32	45%
6 - 10	13	43%	6	23%	1	7%	20	28%
11 - 20	5	17%	2	8%	-	-	7	10%
21 -40	4	13%	-	-	-	-	4	6%
41 - 60	2	7%	-	-	-	-	2	3%
61 - 80	-	-	-	-	-	-	-	-
>80	2	7%	-	-	-	-	2	3%
Total	30	100%	26	100%	15	100%	71	100%

A final issue which may affect purchasing evaluation methods and which is discussed here is degree of computerization within purchasing. When the computer is widely used in this area, it may be argued that:

- information on outstanding orders, invoices, volumes, suppliers, etc can be generated more easily; performance feedback can be generated faster at less costs;
- buyers will be interested in different information, when they are relieved from paperwork, since they get their hands free for their commercial duties.

Table 6.7. indicates to what extent the computer was used. Large companies, as can be seen, tend to use the computer more frequently in purchasing than smaller companies. However, there is no clear relationship between computer-use and company size (see appendix 6). The computer appears to be used most in fields related to purchasing, such as Inventory Management, Listing Product File, and Invoice Processing.

Table 6.7: Degree of Computerization in Purchasing and Related Areas.

Computer used in / Company Size	Large		Medium		Small		Total		
	abs	%	abs	%	abs	%	abs	%	Rank
1. Production Planning *	18	60%	11	42%	3	19%	32	44%	7
2. Inventory Management *	26	87%	21	81%	9	56%	56	78%	1
3. Materials Req's Planning	19	63%	12	46%	5	31%	36	50%	4
4. Order processing	11	37%	3	12%	3	19%	17	24%	8
5. Expediting *	20	67%	11	42%	3	19%	39	47%	6
6. Invoice Processing *	20	67%	21	81%	6	38%	47	65%	3
7. Purchasing Market Research	2	7%	2	8%	-	-	4	6%	10
8. Listing Product File *	22	73%	19	73%	8	50%	49	68%	2
9. Listing Supplier File *	19	63%	15	58%	4	25%	38	53%	5
10. Other	8	27%	8	31%	1	6%	17	24%	8
Number of companies	30		26		16		72		

Our 1982 survey, which included a similar question, and that was conducted among 206 industrial companies, showed similar results. Comparison of both surveys did not provide large differences (6).

Some results on this topic from our interviews were

- purchasing often is not included when computerization starts in the materials area. Usually computerization starts in the production planning and/or inventory control area; often this is done without integrating purchasing;
- computerization in purchasing is hampered by the fact that easy-to-use and/or standard software often does not exist; most software needs to be adapted to specific customer requirements; this often leads companies to design their software themselves;
- introducing the computer within purchasing is difficult, since buyers need to be educated to use the system; this sometimes took some time, since over the years many of them developed their "own systems".

Finally it is observed that most computer systems, when conducting the interviews, were batch systems, rather than real time.

6.4. Purchasing Procedures and Guidelines

Earlier in this study we have seen that in order to evaluate purchasing activities, purchasing responsibilities should be clearly assessed within the organization (see also England and Leenders (1975) pp. 943-944). For this reason we investigated to what extent purchasing responsibilities and guidelines have been formalized e.g. in some sort of manual. More specifically we asked if "rules" existed, "as sanctioned by management which buyers are required to consider during their daily work".

Table 6.8. provides some information on this. Large companies show a greater degree of formalization of purchasing procedures and guidelines than medium sized companies.

Table 6.8.: Formalized Purchasing Guidelines related to Company Size

Formalized Purchasing Guidelines * Company Size	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
Yes	27	75%	16	62%	12	90%	55	76%
No	3	25%	10	38%	4	10%	17	24%
Total	30	100%	26	100%	16	100%	72	100%

As can also be seen from this table the smaller companies, represented in our sample, show a high degree of formalization. This may be due to the fact that many smaller companies were related to a larger group, which may explain this result. Moreover, as we have said before, we feel that only the more advanced smaller companies have been included in our survey.

During our interviews, however, the degree of formalization appeared to differ between companies. In some companies purchasing procedures and guidelines had been laid down in substantial (loose-leafed) manuals. Other companies had these written down only in a one-paper statement.

Respondents gave the following comments concerning the use/benefits of formalized procedures and guidelines:

- a purchasing manual contributes to standardized operations; it enables the purchasing department to show one, single "face" to the outside world;

- a purchasing manual prevents questions: all the buyer should know, can be found in it;
- newcomers in the company can find all information on how the purchasing department operates;
- responsibilities of the purchasing department are clearly laid down and sanctioned by management; it prevents conflicts within the company on who is competent for certain matters;
- it facilitates communication and coordination since purchasing procedures and guidelines may be integrated with and/or adjusted to these of other departments;
- a purchasing manual provides a basis for controlling purchasing activities; deviations from standard procedure can be easier identified.

Respondents showed general agreement as to the value of purchasing manuals. However, some purchasing managers of smaller companies stressed informal communication, which was preferred over formal evaluations.
When established, who was involved in establishing purchasing procedures and guidelines? As can be seen from Table 6.9. general management plays a major role in this. However, this question has been answered both by purchasing managers and buyers. There appeared to be some minor difference of opinion between the two respondent groups; purchasing managers in general did assign themselves more authority than buyers did (see Van Weele (1981)).

Table 6.9.: "Who is involved in determining purchasing procedures and guidelines".

Participants Company Size	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
Production planning	6	13%	4	15%	2	13%	12	17%
Materials management	8	27%	3	12%	4	25%	15	21%
General management	13	43%	11	42%	6	38%	30	42%
Central/Corporate Purchasing	11	37%	4	15%	4	25%	19	26%
Purchasing management	6	20%	2	8%	2	13%	10	14%
Other	7	23%	6	23%	3	19%	16	22%
Number of companies	30		26		16		72	

Also from this table it can be derived that in large companies, on average, more parties are involved in establishing purchasing procedures and guidelines than in smaller companies.

6.5. Budgets in Purchasing

The Purchasing Materials Budget

As we have seen in Chapter Two (section 2.3.) budgets are valuable instruments to control purchasing activities. In our research, questions have been confined to the materials budget and the purchasing departmental budget. Table 6.10 provides some information as to the extent to which both are used by the responding companies.

Table 6.10: Purchasing Budgets related to Company Size.

Purchasing Budgets \ Company Size	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
- Materials budget + Dept. Budget	13	43%	7	27%	5	31%	25	35%
- Materials budget only	-	-	2	8%	1	6%	3	4%
- Dept. budget only	16	53%	9	35%	6	38%	31	43%
- Neither of both	1	3%	8	30%	4	25%	13	18%
Total	30	100%	26	100%	16	100%	72	100%

From this table it can be concluded that:

- 39% of the respondent companies did have some form of a materials budget;
- 78% of the companies did have a departmental budget.

Apparently, budgets in purchasing seem to be used more commonly by the larger companies.

Is a materials budget a proper tool to measure purchasing performance? What are its benefits and limitations for this purpose? These questions were adressed to the 52 people who were interviewed.

.Respondents cited the following benefits, which can be derived from a materials budget:

- prices of purchased materials are an important issue, when budgeting end-products cost-prices; therefore, certainly where purchasing has a large share in the cost-price, some form of budgeting is mandatory in this field;
- purchasing materials budgets are the basis for determining purchasing's share in the endproducts' costprice;
- when established, the materials budget provides some guidance to buyers when negotiating prices for future contracts;
- based on this budget, buyers can be evaluated on their price- effectiveness;
- the budget provides some tool for evaluating how the budget is doing;
- establishing budget prices requires thorough market- and product knowledge; buyers are more willing to conduct market research;
- the purchasing materials budget is a source of information for other departments.

As disadvantages/limitations were mentioned:

- the budget is difficult to establish since:
  - . volume may change due to changes in production schedules and hence affect prices (this was especially a problem when producing-on- order)
  - . prices for some materials (especially commodities) are very difficult to forecast;
- keeping the information up-to-date and monitoring performance requires a lot of effort.

In general, the materials budget was considered as a valuable tool for purchasing management. Considering this and the advantages which were cited it seems strange that only one third of the companies was working with such a budget. This figure seems rather low.

Forecasting purchasing prices was considered to be a delicate matter (7). Some purchasing managers did not evaluate their buyers upon variances between actual and budgetted prices. The comments of one of them, buying fresh fruit products for a cannery-factory, were, that since a buyer could not influence the market-prices for these prices, he could not be evaluated on them. Most managers agreed

that buyers should have the possibility to influence on purchasing prices, when they were to be evaluated on them.
Other managers argued that buyers, since they are specialists in their field should be able to give adequate forecasts for their product assortment. If variances between actual and planned prices occurred, they reasoned, this could be due to:

- lack of market knowledge of the buyer
- ineffective sourcing and negotiating tactics.

Both could be attributed to the individual buyer.

The materials budget was used as the basis for regular reporting-procedures. Subjects reported were

- price-variances (absolute, percentages) per buyer, supplier, line-item, product-group (ABC-items)
- volume-variances (absolute, percentage) per buyer, supplier, line-item, product-group (ABC-items).

Concluding this paragraph, we may say that the purchasing materials budget can only serve as a tool for monitoring performance, if:

- buyers to some extent can exert control over purchasing prices
- buyers have some responsibility in sourcing decisions
- information concerning volumes and prices is kept up to date.

The latter point, beyond doubt, will require some degree of computerization of purchasing activities. It may be concluded that purchasing budgets may serve as tool for evaluation depending on the characteristics of the product. It's use will be limited when buying commodity goods, but it may be appropriate when buying customer made components. We will address this issue into more depth in Chapter Eight.

Purchasing Departmental Budget

The purchasing departmental budget was in all cases established in an incremental way. This implies that data of previous years were taken as basis and increased with a certain percentage.
Estimations of salaries etc. were calculated based on guidelines from the Personnel Departments. Other cost-categories, such as travel-expenses and expenses related to visiting fairs and exhibitions were usually based on concrete plans for the next year. Some respondents mentioned that budgets were influenced by

company-performance. Losses occurred lead in those companies to more tight purchasing budgets: travel expenses got shortened considerably.

6.6. Evaluating Purchasing Performance

6.6.1. Introduction

To obtain information as to how and to what extent participating companies did evaluate purchasing performance, methods and ratios have been divided into 5 groups i.e. (8):

- cost-related measures i.e. performance measures used to evaluate how purchasing did in controlling and reducing product-related costs;
- departmental related measures, used to evaluate the overall departmental performance.
- buyer related measures, used to monitor and evaluate the performance of the individual buyer;
- quality-related measures, used to control and improve the quality of incoming materials;
- delivery-related measures; i.e. performance measures used to evaluate how well purchasing succeeded in meeting required quantities and required dates;

As can be seen from Table 6.11 cost-related measures were used most. Quality- and delivery related measures apparently are less popular, with only 28% and 26% resp. of the participating companies using these.
From these results it may be concluded that purchasing performance evaluation is somewhat more formalized at larger companies compared with smaller companies; the former report to use, on average, more performance categories (2.66) than the latter (2.37).

However, compared with medium-sized companies the participating smaller companies score higher.
The data in Table 6.11. do not indicate to what extent or how frequently appropriate measures were being used; neither do they indicate how they were appreciated by purchasing practitioners.
From this table it may be concluded that company size per se is not a variable for explaining purchasing performance measurement.
In the remainder of this paragraph the five groups of measures are discussed in more detail.

Table 6.11.: Type of Measure Related to Company Size

Type of Measures / Company Size	Large		Medium		Small		Total		
	abs	%	abs	%	abs	%	abs	%	r
Cost Related Measures	25	83%	16	62%	10	63%	51	71%	1
Departmental Related Measures*	21	70%	8	31%	11	69%	40	56%	2
Buyer related measures*	17	57%	5	19%	7	44%	29	40%	3
Quality Related Measures	9	30%	6	23%	5	31%	20	28%	4
Delivery Related Measures	8	27%	6	23%	5	31%	19	26%	5
Number of companies	30		26		16		72		

6.6.2. Cost Related Measures

Table 6.12. shows what cost-related measures were being used by participating companies. The three measures, which were most frequently used were:

- actual costs per product versus budgeted costs
- actual costs per product versus historical costs
- actual costs per product versus other suppliers costs.

Further analysis revealed that the first measure is used most by those companies having a purchasing materials budget. From this Table it appears that cost-related measures are used more frequently by larger companies than by smaller companies. A final observation is that cost-avoidance and cost-reduction rank rather low in actual use, with only 18% resp. 22% of the companies using these. From this table we may conclude that cost-related measures are used more frequently by the larger companies than by smaller ones: however, there are no significant relationships between measures actually being used and company size. Another conclusion from this table is that when purchase prices are being formally evaluated, usually more than one measure is being used.

The benefits and limitations of using the materials budget as a tool to evaluate buyer performance have been discussed in Chapter 5.2. of this study.

Table 6.12.: Cost Related Measures related to Company Size

Cost Related Measures / Company Size	Large		Medium		Small		Total		
	abs	%	abs	%	abs	%	abs	%	rank
- actual costs per product vs historical costs	15	50%	7	27%	5	31%	27	38%	2
- actual costs per product vs other suppliers cost	12	40%	7	27%	6	38%	25	35%	3
- actual costs per product vs budgeted costs	13	43%	10	38%	6	38%	29	40%	1
- materials costs expressed as % of total end product costs	11	37%	6	23%	1	6%	18	25%	4
- materials costs related to purchasing turnover	8	27%	8	31%	2	13%	18	25%	4
- cost-avoidance	9	30%	2	8%	2	13%	13	18%	7
- cost-reduction	10	33%	4	15%	2	13%	16	22%	6
- other	2	7%	-	-	-	-	2	3%	8
Number of companies	30		26		16		72		
average number of cost-related measures used:	2.66		1.69		1.50		2.05		

With regard to the usefulness of cost-avoidance and cost-reduction as measures of purchasing performance, many comments were made. The following statements summarize the limitations, which were mentioned:

- focussing on cost-reduction in purchasing only, can lead to excessive "price-hunting", where price is considered irrespective of quality- and or delivery-aspects;
- cost-reduction as a measure of purchasing performance should not endanger long-term relationships with suppliers;
- cost-reduction should be carefully defined; everyone should have the same idea of it;
- cost-reduction in purchasing should not result in neglecting local suppliers for only a minor price-difference;
- the appropriateness of cost-reduction as a measure of purchasing performance depends on the characteristics of the products purchased; usually it will be difficult to apply this concept to purchasing raw materials and commodities, which are primarily market oriented; the concept, however, is useful when buying custom-made components;

- quantification of cost-reduction in purchasing is a problem: over which period do they need to be calculated?
- cost-reduction should be balanced against the efforts, through which they have been realized;
- cost-reductions should be structural and not an one-time event; they should lead to a long-lasting reduction of the end products cost-price.

However, notwithstanding these limitations, the following comments were made concerning the benefits:

- cost-reductions as a measure of purchasing performance focusses managements attention on purchasing as a commercial business activity;
- a buyer should be able to earn money for the company: cost-reductions visualize how well he succeeds in doing this;
- cost-reduction targets, as established by management, stimulate to perform better; they keep purchasing awake and active.

Not all companies, where cost-reductions were used as a measure of performance, did differentiate between cost-avoidance and cost-reduction (9). Furthermore, the weight given to this performance measure in evaluating purchasing performance differed among companies.
Some companies reported savings in a rather informal way. Other companies (especially some USA-based companies, which we have visited, had elaborate and highly formalized cost-reduction programs, which consisted of clear objectives and procedures and which were carefully monitored.

6.6.3. Evaluating Purchasing Departmental Performance

Table 6.13. shows what measures were being used by the participating companies to monitor purchasing departmental performance. The measures, which were used most in this respect, were:

- number of purchase orders per period
- total purchasing turnover
- total cost-reduction realized
- total price increase on purchased materials.

Although our statistical analysis shows some significant relationships, these are weak. It therefore cannot be concluded that the actual use of these measures relates to company size. Larger companies use in general more measures than

smaller companies; however these, on their turn, report on average more measures than medium-sized companies.

In interpreting this table, it should be recognized that only 56% of all companies reported to use this kind of measures. This implies that 44% does not measure purchasing performance in a formal way using one of these measures.

This, however, does not imply that purchasing departmental performance in the remainder of the companies is not measured at all. In these cases purchasing performance often was evaluated in a more qualitative and subjective way. Criteria which were reported during our interviews, were:

- problems in relationships between purchasing and other departments;
- complaints of requisitioning departments;
- interventions by management in purchasing affairs;
- production-interruptions due to problems of quality and/or delivery- times;
- changes in production-schedules due to inability of purchasing to live up to expectations;
- purchasing staff versus that of other companies operating in the same industry.

These statements were made by managers, when asked on which measures they were being evaluated by general management. Most of them are rather qualitative and subjective in scope. It should be noted that in most cases these measures were not registered or administered. It therefore can be concluded that in the companies, not reporting to use formal evaluation measures, purchasing is not evaluated in a systematic manner.

6.6.4. Evaluating Individual Buyer Performance

As might be expected, larger companies reported more measures, used to evaluate individual buyer performance than smaller companies. (See Table 6.14.). This, again, indicates a higher degree of formalization of performance evaluation at larger companies. These tend to use in general more measures than smaller companies. As most important measures were considered:

- number of purchased items per buyer
- purchasing turnover per buyer
- number of purchase orders per buyer in a certain period

- cost-reduction realized per buyer.

Table 6.13: Departments Related Measures and Company Size.

Department Related Measures \ Company Size	Large		Medium		Small		Total		
	abs	%	abs	%	abs	%	abs	%	rank
- purchased items	6	20%	2	8%	1	6%	9	13%	6
- purchase orders per period*	17	57%	5	19%	5	31%	27	38%	1
- total purchasing turnover*	15	50%	5	19%	4	25%	24	33%	2
- total requests for quotations*	7	23%	-	-	4	25%	11	15%	5
- total cost-reduction realized	10	33%	3	12%	3	19%	16	22%	3
- total materials price-increase	10	33%	4	15%	2	13%	16	22%	3
- late deliveries	4	13%	2	8%	2	13%	8	11%	7
- early shipments	2	7%	1	4%	-	-	3	4%	11
- supplier plant visits	5	17%	1	4%	-	-	6	8%	8
- returned deliveries	4	13%	1	4%	-	-	5	7%	9
- other	-	-	3	12%	1	6%	4	6%	10
Number of companies	30		26		16		72		
Average number of measures used:	2.66		1.03		1.37		1.79		

During our interviews it appeared that companies used the former three to get an idea of the complexity and the responsibility of the individual buyer's job. They were used in an indirect, rather than in a direct way to evaluate purchasing activities. Table 6.14. shows in general no significant relationships between actual measures used and company size, with the exception of "number of purchased items" and the "average price increase percentage per buyer". Both seem to be used most by the larger companies.

Table 6.14.: Buyer Related Measures and Company Size

Buyer Related Measures \ Company Size	Large		Medium		Small		Total		
	abs	%	abs	%	abs	%	abs	%	r
- purchased items*	15	50%	2	8%	3	19%	20	28%	1
- purchase orders per period	9	30%	3	12%	1	6%	13	18%	3
- requests for quotations	5	17%	1	4%	1	6%	7	10%	6
- purchasing turnover in Dfl.	10	33%	3	12%	2	13%	15	21%	2
- cost reductions per period	8	27%	2	8%	3	19%	13	18%	3
- average price-increase percentage per buyer*	8	27%	-	-	-	-	8	11%	5
- orders delivered in time	2	7%	3	12%	2	13%	7	10%	6
- early deliveries	1	3%	1	4%	-	-	2	3%	10
- late deliveries	1	3%	2	8%	2	13%	5	7%	8
- supplier plant visits	4	13%	1	4%	-	-	5	7%	8
- other	-	-	1	4%	-	-	1	1%	11
Number of companies	30		26		16		72		
Average number of measures used:	2.10		0.73		0.88		1.33		

During our interviews, we encountered two, rather opposing points of view on how to evaluate individual buyer performance:

- buyers should be able to earn money for the company; purchasing performance evaluation should reflect this notion;
- purchasing is teamwork, a buyer cannot operate on its own; he therefore should be only evaluated on those aspects, over which he can exert control.

Both points of view tended to result in different criteria. In the first point of view criteria were suggested as: cost-reductions realized by purchasing, inflation reported per buyer, number of new suppliers and number of single/sole sources.

The second point of view stressed number of supply- and quality problems, number of purchasing orders, number of annual agreements, purchasing administrative leadtime etc.

In general buyers were evaluated by their direct superior. Sometimes this superior was assisted by a second (middle)-manager. From our interviews it became clear that qualitative and subjective criteria were more frequently used and better appreciated in evaluating individual buyer performance than the reported measures. Examples of qualitative criteria are:

- commitment of the buyer to his work and company;
- initiative and new ideas and plans for further computerization, procedures etc.;
- product- and market-knowledge;
- ability to negotiate; how are the buyer's relationships with vendors;
- accuracy and administrative abilities;
- ability to remain within the budget;
- internal communication; how well is he respected by other departments;
- creativeness; ability to solve old problems with new solutions;
- ability to anticipate on future problems;
- ability to put priorities in his work;
- flexibility to adapt to changes in materials requirements programs etc.

One purchasing manager always would ask suppliers (which he knew very well) for their opinion, concerning his buyers. He always appreciated their opinion since, as he saw it, sales-agents and representatives were the only ones, able to give a fair opinion due to their many contacts with the market.

6.6.5. Evaluating the Quality of Incoming Materials.

Table 6.15. shows measures being used by companies to evaluate purchasing's ability to acquire materials against the required specifications. It appears that very few measures are used in this respect; 72% of the companies reported to use none of these measures (see also Table 6.11.), which is disappointing considering the importance of this subject. The limited number of observations does not permit statistical analysis.

These results may be due to the limited responsibility of purchasing in this area. As we have seen in table 6.3. purchasing in only 17% of the companies is formally responsible for inspecting the quality of incoming materials.
From our interviews we report the following reasons for this limited activity:

- limited number of suppliers; most suppliers were well known on a personal basis; there was no need to quantify their quality assessment;
- limited purchasing assortment; products with quality problems were known to the buyer;
- no personnel available to develop a formal supplier-quality assessment;
- lack of confidence in formal quality measures; establishing a standard was thought to be a rather arbitrary matter;
- formal quality measures do not indicate underlying reasons; knowledge of why variances did occur is required to be able to improve supplier performance.

These limitations may be summarized into the following problems associated with an objective evaluation of the quality of purchased materials:

- selecting the standard: which standard should be used in evaluating the quality of incoming materials?
- measurement: which method is being used to identify quality problems?
- terms of reference: what aspects should be measured i.e. what aspects are being considered to represent the quality of incoming materials?

Considering these problems, many interviewees had little confidence in formal measures. It was frequently mentioned not to try to make a "picture" of the supplier, when not all relevant aspects were included. One purchasing manager of a multi-plant company reported the development of a formal vendor-evaluation system for all operating units. It appeared that ratings for suppliers differed to a great extent for all purchasing departments. In this respect this manager stressed the subjective elements involved in measuring quality. He indicated that production people's preferences for certain vendors for example may hamper an objective evaluation.
Notwithstanding these limitations, respondents agreed that a formal assessment should get more attention:

Table 6.15.: Quality Related Measures and Company Size

Quality Related Measures \ Company Size	Large		Medium		Small		Total		
	abs	%	abs	%	abs	%	abs	%	r
- ≠production stops due to purchased materials	5	17%	4	15%	3	19%	12	17%	2
- ≠returned deliveries	10	33%	3	12%	3	19%	16	22%	1
- ≠reworks + repairs	6	20%	3	12%	2	13%	11	15%	3
- ≠renewed orders	5	17%	2	8%	2	13%	9	13%	4
Number of companies	30		26		16		72		
Average number of measures used:	0.86		0.46		0.63		0.67		

- insight in the supplier's quality-performance is important since a bad performance has a direct impact on the quality of the end-product;
- some suppliers need to know that their materials are continuously measured: otherwise they will pay less attention to the company's requirements;
- measuring product quality may reassure production personnel; when product quality is measured, this may overcome resistance from production personnel against e.g. change of supplier;

- long term relationships with suppliers should result in better performance; comparing historical and actual figures should indicate progress; if this progress is not perceived there is something wrong;
- formal quality assessment leads to suppliers, who are more alert to the buyer's needs; this may result in the long term in better service and lower prices.

It is our opinion that quality assessment in purchasing is little practised. Consequently there seems to be much room for improvement. We will come back on this issue in Chapters Seven and Eight.

6.6.6. Evaluating Purchasing Logistics

Table 6.16. shows the Delivery.Related Measures, which were ranked last by responding companies. Also these appear to be little used. "Percentage of late deliveries" within this group appears to be used most, although 17% is not striking.

Apparently, companies do not use this kind of measures much. As reasons for this rather low score were cited:

- with most suppliers long term relationships exist: formal performance assessment is not necessary since the most problematic suppliers are known to each buyer;
- suppliers are so few, that they are known to each buyer;
- measuring delivery-performance is not very useful, since delivery dates are seldom critical;
- bad delivery-performance may not always be due to the supplier; purchasing orders may be issued too late by the buyer, while neglecting formal delivery times (such as is the case with rush-orders);
- figures do not indicate underlying causes for bad delivery;
- incomplete or over-deliveries may be a result of the supplier's production processes; it is not always fair to blame the supplier for this.

Table 6.16.: Delivery Related Measures and Company Size.

Delivery Related Measures \ Company Size	Large		Medium		Small		Total		
	abs	%	abs	%	abs	%	abs	%	r
- % timely deliveries	3	10%	3	12%	3	19%	9	13%	2
- % early shipments	2	7%	2	8%	1	6%	5	7%	4
- % late deliveries	6	20%	3	12%	3	19%	12	17%	1
- % complete shipments	2	7%	2	8%	2	13%	6	8%	3
- % incomplete shipments	2	7%	-	-	1	6%	3	4%	6
- % over-deliveries	2	7%	-	-	1	6%	3	4%	6
- other	1	3%	2	8%	1	6%	4	6%	5
Number of companies	30		26		16		72		
Average number of measures used:	0.60		0.46		0.75		0.58		

As benefits of this type of measures were mentioned:

- identification of unreliable suppliers in a more formalized and objective way;
- they may serve as a tool for evaluating supplier delivery-reliability;
- they may be used as a tool for evaluating individual buyer performance;
- measurement enables to anticipate on future (potential) delivery- problems.

An explanation for the rather low score of delivery related measures may lie in the fact that at many companies that were visited, delivery-times were reported not to be critical. Usually, many actions were taken to protect the company against the consequences of bad delivery-performance. Examples of these actions are: adding a safety-margin to the supplier's delivery time (sometimes up to six weeks!), ordering materials earlier than necessary, working with buffer-inventories etc. Due to these measures, consequences of late deliveries (if they were limited to one or two weeks) were not desastrous. According to several purchasing managers these measures were necessary, due to the lack of service of many Dutch manufacturers, which in their opinion did not have sufficient control over their materials flow.

For this reason delivery related measures, as reported, were mostly kept for the most problematic suppliers.

As can be seen in Table 6.16, Delivery.Related Measures were relatively used more by smaller companies.

6.6.7. Further Analysis and Complementary Data

Our research variables have, until thusfar, only been related to company size. In our analysis we have also related the five different groups of performance measures to other variables, such as:

- purchasing's share in company sales
- purchasing departmental size
- purchasing reporting relationships
- production technology
- purchasing product-range.

For reasons of brevity cross-tabulations have been omitted here. Only the major findings are reported. More details on our statistical analysis can be found in Appendix 2.

Our statistical analysis indicates that:

- buyer related measures, quality related measures and delivery related measures are used more by companies having a large purchasing turnover ratio (larger than 60%), compared with companies having a lower purchasing turnover ratio (less than or equal to 40%); however, with the exception of delivery related measures, relationships are weak and not significant;

- cost related measures, department related measures and buyer related measures in our sample seem to be used more frequently by the larger departments (having more than 10 employees) than by the smaller purchasing departments (i.e. having less than 6 employees). Furthermore, the larger the purchasing department, the more the several categories of measures seem to be used. Also here, no clear and significant relationships (with the exception of cost-related measures) occur.

- when related to type of measures, purchasing reporting relationships do not allow any meaningful conclusion; this implies that the manager, to whom purchasing actually reports, does not influence the type of measure being used in purchasing performance evaluation;

- in general Production Process Technology is not an explaining variable; there is in general no difference in measures used by companies with mass-production and those with batch-production; however, an exception should be made for cost-related measures which seem to be used more frequently by companies with mass-production; our analysis showed a weak, though significant relationship.

- purchasing performance measures seem not to correlate with purchasing product range; no significant differences were found between companies with a limited product-range (less than 2500 items) and companies with a large product-range (greater than 20.000 items).

Finally, in Appendix 3 we have included some facts and figures with regard to some important purchasing performance ratio's.

6.7. Conclusions and Some Observations

It is stressed here that our findings only relate to the companies, which have been included in our sample. Our sample of companies is not representative for the following reasons:

- one third of the companies involved in our research was not randomly selected;
- the subject of our research has influenced the sample of participating companies somewhat: those companies which did not have formal evaluation procedures usually did not participate.

It is our impression that the more "advanced" companies in the area of purchasing performance measurement, have participated in our survey.

Our research methodology and small sample size did not allow for the application of advanced statistical research-techniques. Therefore, our statistical analysis has been kept relatively simple.

Considering the importance of the purchasing function in Dutch industry and the long standing history of purchasing performance measurement in literature (See Chapter Four), we feel that the number of companies, that use formalized performance evaluation systems in their purchasing department, is rather low. Our results indicate that only a minority of the selected companies did evaluate purchasing performance in a more or less systematic and formalized way.
However, as we noticed during our interviews, the degree of formalization may differ among companies.

From our sample, it can be concluded that:

- the type of measures, which were used most among companies were (in decreasing order)

costrelated measures	(71%)
department related measures	(56%)
buyer related measures	(40%)
quality related measures	(28%)

delivery related measures (26%)

- the individual performance measures, used most among companies were (in decreasing order):
  actual costs per product versus forecasted costs (40%)
  actual costs per product versus historical costs (38%)
  number of purchase orders released (38%)
  actual costs per product versus other suppliers costs (35%)
  total purchasing turnover (33%)
  number of purchased items (28%)
  materials costs related to purchasing turnover (25%)
  materials costs expressed as percentage of total end-product costs (25%)

- in explaining the application of certain purchasing performance measures, these were found not to depend in a significant way on:
  company size
  production process technology
  purchasing department size
  purchasing's share in end-product's costs
  purchasing reporting relationships
  however, cost-related measures are more likely to be used in companies with purchasing departments with more than 10 people employed with mass-production technology.

  Considering these results it is our impression that purchasing evaluation techniques are determined primarily by behavioral variables, rather than by structural variables. Behavioral variables include management style, characteristics of the manager in charge of purchasing, responsibilities assigned to purchasing, scope of the purchasing function etc.

- evaluating purchasing departmental performance and buyer performance is mostly performed using qualitative and subjective criteria;

- evaluating the quality of incoming materials is based upon a limited number of criteria: as it appeared consequences of defective quality are seldomly stated in quantitative terms;

- supplier delivery reliability is seldomly critical due to many preventive measures being taken by companies; this may explain the rather low figure for delivery related measures.

Notes to Chapter Six

1. See our research-paper:
   - Het Meten van het Inkoopresultaat (Van Weele (1981))
   - Enige kerngegevens over de Inkoopfunctie: in de Nederlandse industrie (Van Weele (1983)).

   More information can also be found in our book, which has been published by the Dutch Association of Purchasing Management (Van Weele (1981), (1981a) and (1982)).

2. See Dunn and Bradstreet, Overzicht van de Nederlandse Industrie, 1978.

3. A frequency table of these reasons could not be provided, since many companies did not cite their reason for their refusal to cooperate.

4. Our survey conducted in 1982 asked a similar question from thirteen responsibilities, which could be formally assigned to the purchasing department; large companies reported on average 6.72, while the smaller companies reported on average 7.00, responsibilities.

5. One of the smaller companies did not answer this question: therefore, the column total adds up to 15 observation in this table.

6. In our 1982 survey these three activities were among the three most mentioned: however, their ranking was: Invoice Processing (with 71.8% of the companies having computerized this) Inventory Management (70.4) and Listing Product File (66.0%).

7. Many times the issue of forecasting materials prices and their intricacies was raised in a similar way as has been described in section 5.2. of this study.

8. The rationale for this classification is presented in Chapter Seven.

9. See our discussion in Section 5.3. of this study.

CHAPTER SEVEN: OPERATIONAL CONTROL IN PURCHASING: A CONCEPTUAL APPROACH

7.1. Introduction

In this Chapter we want to provide a conceptual framework, which can be used to monitor and control purchasing performance. This framework is based on insights that we gained from our literature survey. However, for an important part it draws on our experiences with the industrial companies, which participated in our survey.

Specific issues which are covered are:

- why should purchasing performance be evaluated; what are important benefits and limitations from it?;
- what should be measured? ;
- how can evaluation standards be established and implemented?

The Chapter is concluded with a description of how purchasing performance measurement, evaluation and control are interrelated. Although often used interchangeably we will see that they in essence are different activities.

7.2. The scope of the Purchasing Function

Already in 1962 Hayes and Renard suggested that the expectations of local management towards its purchasing organization were important factors for the degree of formalization and actual techniques used. Having conducted our research, we tend to agree with this point of view. To our opinion differences in methods used to measure and evaluate purchasing can be explained by differences in management style, degree of formalization and responsibilities delegated to the purchasing function, rather than by structural variables (such as type of production process, type of industry, purchasing turnover ratio etc.). What management expects from purchasing does affect its performance evaluation methods. These expectations to a large extent determine, as we designate it, the scope of the purchasing function, i.e. the set of tasks, objectives and responsibilities, assigned to the purchasing department, as sanctioned by management

When we try to categorize our impressions on how the scope of purchasing in Dutch industry is, three alternative views emerge:

- purchasing, as considered by management as a clerical function,
- purchasing, as considered as a commercial activity, handling a large part of the company's (material and services) expenditure,
- purchasing, as considered as a strategic business function.

Depending on each view, the position of the purchasing department within the organization and/or the measures used for purchasing evaluation will differ. As can be seen from Exhibit 7.1., performance measures will be mainly quantitative and administrative in character in the first situation.
When purchasing is considered as a strategic business function, performance measures seem to be more qualitative and judgmental. However, as it appeared, at these companies often a complex framework of procedures and guidelines exists, which is used to improve purchasing effectiveness and efficiency and to monitor progress against plans.

How can these alternative views on purchasing be explained?
Considering purchasing as a strategic business area may be due to external factors, such as long term problems in the supply market, which have focused management's attention on the purchasing function.
However, it will also be due to internal factors such as

- management style
- responsibilities assigned to the purchasing function
- characteristics of the person in charge of purchasing
- profitability of the company etc.

7.3. Why measuring purchasing performance?

What benefits can be derived from a systematic performance evaluation? During our research we confronted many purchasing managers with this question. Their answers are summarized in the following statements:

- purchasing performance evaluation can lead to better decision making since it identifies variances from planned results; these variances can be analyzed for their causes and concentrated action may be taken for preventing them in the future;

Scope of Purchasing	Position of Purchasing	Purchasing Performance Measures	Focus on
Purchasing is a clerical function	Low in organization	Number of orders, backlog, purchasing adm. leadtime, authorization, procedures, ...	efficiency
Purchasing is a commercial activity	.Reporting to management	Savings, cost-reduction, negotiation, contracting, single/sole sources...	efficiency
Purchasing is a strategic business function	Purchasing integrated in strategic planning process	Supplier development, make vs. buy studies, integration with.R+D, value analysis, purchasing engineering	effectiveness

Exhibit 7.1.: Impressions of how management looks at purchasing

- it may lead to a better communication with other departments; e.g. analyzing payment conditions with the administration and deciding on payment procedures may improve mutual understanding; establishing a materials budget requires coordination with production and inventory control; to obtain this information purchasing has to leave its isolated position;

- it makes things visible: regular reporting of planned versus actual results enables the buyer to verify if his expectations have been realized or not e.g. reporting inflation versus actual price increases may indicate the buyer's price-effectiveness;

- it may contribute to better motivation: if it is adapted to the needs and requirements of the buyer it may lead to higher motivation. As one manager put it: "Realistic targets as established together with the buyer lead the buyer to try to perform better than target".

Summarizing these comments we might conclude that purchasing performance evaluation should result in a higher ADDED VALUE of the purchasing department to the company. This higher added value could result in cost-reductions, lower material prices, etc: however, it may also result in less rejects, less single and sole sources etc.

With regard to the question, why purchasing performance should be regularly evaluated, in our opinion two points of view are feasible (2).
One is that performance evaluation should be conducted in order to rate the individual buyer. In this view measurement is primarily to serve the purposes of control, evaluation and ultimately rewarding or punishing the individual buyer.
Another view is that systematic performance assessment primarily should serve the purposes of self-appraisal. In this view it is felt that improvement of purchasing activities can be achieved best by enabling the buyer to assess the results of his negotiations himself. The evaluating-activity here is directed towards support of the individual buyer in doing a better purchasing job. By comparing planned figures with actual outcome the buyer directly is able to see how he performed. What should be the prime consideration for evaluating purchased activities?

We would like to conclude that purchasing performance evaluation should primarily serve as an aid to the buyer to improve his individual performance; it is considered to be less useful for rewarding and punishing purposes. Since, as we will see, standards for performance evaluation cannot be set in an uniform and objective manner, assessment and evaluation of the individual buyer with regard to e.g. his price performance will enhance the risk of manipulating predicted prices as established in the materials budget.

Therefore we support the second view: purchasing performance evaluation should be conducted primarily in order to give buyers support in doing a better job.

This view has some important implications:

- purchasing performance evaluation systems should be designed in such a manner, that they correspond with the daily operations of the buyer: they need to provide information which can contribute to better decision making by the buyer;
- the buyer needs to participate in the establishment of standards for his activities; further, he should agree on the devices, which are used to monitor variances between actual and planned outcomes;
- to improve the practical value, feedback on performance should be provided on a regular basis; if a great deal of time elapses before the buyer is informed on his performance, there is no possibility for him to take corrective action, if necessary. Furthermore this information needs to be presented in a comprehensive way, fitted to the individual buyer's need;
- standards for evaluation should be set for those areas, for which the buyer can be held responsible, since external influences may sincerely affect his performance.

7.4. What should be measured?

The crucial question in purchasing performance evaluation is: to what extent is the purchasing function operating in an effective and efficient way?
Purchasing has been designated once by an early author as one of the more difficult departments to evaluate (Lewis, 1948). And we tend to agree with this statement since there are many problems involved in evaluating purchasing performance, which hamper a simple and objective assessment. As we see it, these major problems are the following:

- lack of definition: although frequently used in practice as well as in theory, terms like purchasing performance, purchasing effectiveness and purchasing efficiency have not been properly defined; some authors even use these concepts interchangeably;

- lack of formal objectives and performance standards: as some authors have indicated (see Ammer, (1974) (1974a), and Leenders, Fearon and England (1980)) the objectives of the purchasing function often are not properly

defined: neither do many purchasing departments operate guided by well defined performance standards;

- problems of accurate measurement: purchasing is not an isolated function; purchasing performance can be considered as the result of many activities, which due to their intangible character are difficult to evaluate; in general direct input-output relationships are difficult to find; this sincerely limits the possibility to measure and evaluate purchasing activities in an accurate and comprehensive way;

- difference in scope of purchasing: as demonstrated by our research, purchasing tasks and responsibilities tend to differ to a large extent between companies: what is designated as "purchasing" in one company, may be referred as "ordering" in another.

These four problems to our opinion limit an objective and accurate assessment of the purchasing function. Therefore it always has some qualitative elements in it in that performance standards, which should serve as terms of reference for future action, should be judgmentally determined.

In order to decide what should be measured, it is necessary first to define purchasing performance. In doing this we closely adhere to the ideas which have been described in Chapter Three of our study. Here we differentiated between effectiveness and efficiency.
Effectiveness was defined as the extent to which, given a certain course of action, a previously established result or goal actually has been met. Essentially the concept related to the relationship between actual and planned performance of any human activity.
Efficiency was defined as the relationship between the expected or normative and the actual sacrifices made in order to realize a previously agreed upon goal. This concept related to the resources/means, of the organization.

Considering these ideas we would like to define purchasing performance as the resultant of:

- purchasing effectiveness: the extent to which previously determined goals and objectives of the purchasing function have been met;

- purchasing efficiency: the relationship between the expected or normative and the actual sacrifices made in order to be able to realize the objectives of the purchasing function.

Purchasing performance thus can be considered as the extent to which the purchasing function is able to realize its predetermined goals at the sacrifice of a minimum of the company's resources. On this definition some comments can be made:

- this definition is in no way operational: it serves rather as a terms of reference, as a way in which purchasing performance can be looked at; it recognizes the fact that any purchasing organization, in order to be effective should have formulated its goals;

- this definition assumes a rather rational decision-making process for resource allocation; a condition, which is not always met in practice;

- effectiveness and efficiency often cannot be as clearly separated as theorists suggest; whether a certain result should be considered as effective or efficient, varies depending on the aggregation level from which the matter is perceived.

Effectiveness is thus related to the objectives of the purchasing function. The standard statement of the overall objectives of the purchasing function is, that it should obtain the right materials (meeting quality requirements), in the right quantity, for delivery at the right time and right place from the right source, with the right service and at the right price (Leenders, Fearon and England, 1980, p. 27). (3)

Based on this statement four key-areas in purchasing performance evaluation are identified i.e.

- Purchasing Price/Cost Dimension
- Purchasing Quality Dimension
- Purchasing Logistics Dimension
- Purchasing Organization Dimension.

The first three dimensions relate to purchasing effectiveness, whereas the purchasing organization in fact relates to the resources through which the purchasing objectives are realized. Hence, it relates primarily to purchasing

efficiency (see Exhibit 7.2.). These four key-areas of purchasing performance evaluation are now described in more detail.

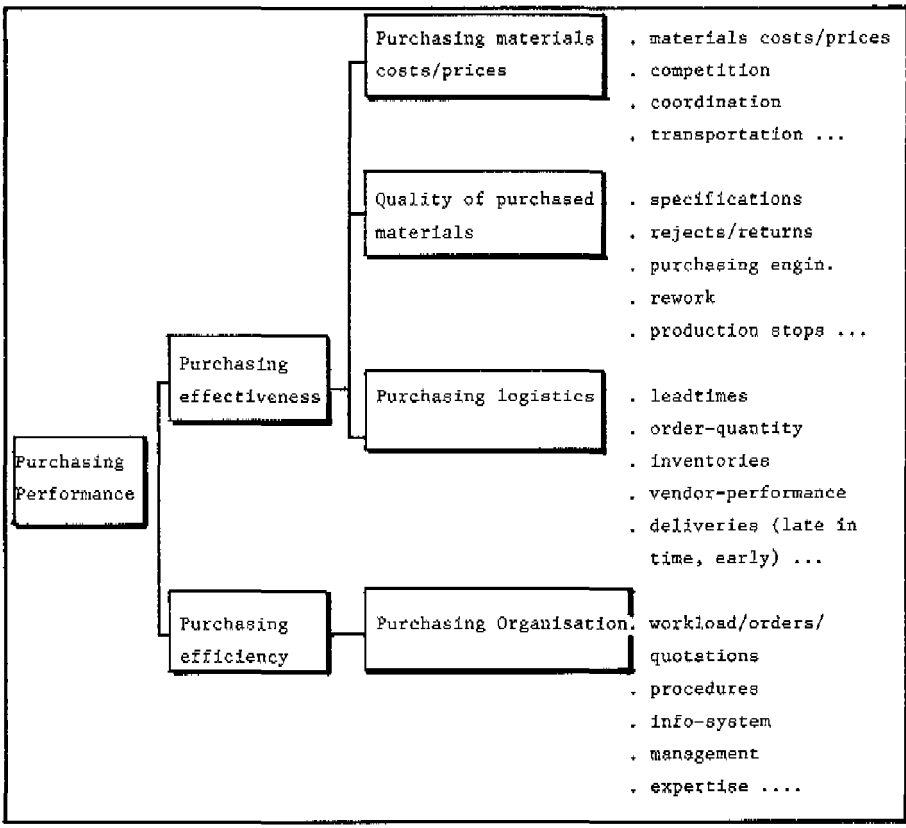

Exhibit 7.2.: Key Areas of Purchasing Performance Evaluation

Purchasing Price/Cost Dimension: this refers to the relationship between standard and actual prices paid for materials and services; a distinction is made between:

- Price/Cost Control which refers to the continuous monitoring and evaluation of prices and price increases as they are announced by suppliers;
- Price/Cost.Reduction: this relates to the continuous monitoring and evaluation of projects initiated to reduce costs associated with purchased materials and services; examples of these projects are search for new suppliers,

and/or substitute materials, value-analysis, coordination of purchasing requirements in multiplant companies etc.

Purchasing Quality Dimension: this relates to:

- purchasing's involvement in the pre-development stage of new products or projects;
- purchasing's involvement in specifications of products actually being in production.

Purchasing Logistics Dimension

A third key area of the purchasing function is it's responsibility for an efficient incoming flow of purchased materials and services. This area comprises three major activities:

- control on timely receipt of requisitions: this includes supervision on how and when requisitions should be sent in, and furthermore how and when they should be processed by the purchasing organization;
- control on timely delivery by suppliers: this includes providing up-to-date information to requisitioners concerning actual delivery times and changes, expediting orders issued, and taking corrective action if suppliers do not keep their promises;
- control on quantities delivered: quantities delivered should meet the quantities ordered; this requires regular communication with incoming inspection, control of/on partial deliveries, and corrective action in case of variances between ordered and delivered quantities.

In some cases a fourth area of responsibility can be added, namely inventory control. However, since this function is not considered here as a prime responsibility of the purchasing function (but belonging to materials management) inventory control is not further discussed here.

Purchasing's Organization Dimension: this dimension includes the resources which are used to achieve the goals and objectives of the purchasing function. With regard to these resources a distinction can be made in:

- purchasing personnel: people employed in the purchasing area
- purchasing management: those, who determine, guide and control purchasing strategies and policies

- purchasing procedures and guidelines: formalized instructions, generally approved by top-management, according to which purchasing activities should be executed
- purchasing information systems and research: activities, which are either performed by buyers, either by a specialized staff-function, providing support for purchasing personnel in fulfilling their daily operations or which are aimed at improving the techniques they currently use.

1. Purchasing materials prices/costs	. materials price/cost control . materials price/cost reduction
2. Purchasing logistics	. adequate requisitioning . vendor delivery reliability: - supplier leadtimes - quantities delivered
3. Quality of purchased materials	. purchasing's pre-design involvement . purchasing's post-design involvement
4. Purchasing organization	. personnel . management . procedures + guidelines . information systems

Exhibit 7.3.: Four dimensions of purchasing performance evaluation

Exhibit 7.3 . provides an overview of the key-areas of purchasing performance evaluation. It is suggested that in order to evaluate purchasing activities properly, companies should focus on each of these areas.

Overseeing this overall picture the following should be recognized:

- Exhibit 7.3. and the underlying ideas are primarily to serve as a terms of reference rather than as a well-defined model; in our view it may contribute

thinking about evaluating effectiveness and efficiency in that it clearly shows some key areas which should be covered in any evaluation of purchasing performance;

- Purchasing Price/Cost, Purchasing Quality and Purchasing Logistics are considered here as elements of effectiveness whereas Purchasing Organization is considered primarily to refer to efficiency; this, since we consider any organizations as a means to achieve certain ends.
  However, in some cases certain elements of the organization may be translated in terms of goals e.g. if management determines to improve the quality of purchasing personnel by providing in better or more education. In that case quality improvement may be considered as an objective (i.e. pertaining to effectiveness), however it is primarily to serve a better functioning of purchasing in terms of product, price and place-dimensions;
- It will be clear that interrelationships exist among all four dimensions: e.g. if purchasing strives for lower purchase prices in a rigorous way, this may ultimately affect quality of incoming goods (Purchasing Price/Cost dimension affecting the Purchasing Quality Dimension). The reverse may also be true: striving for better quality in terms of e.g. zero-defects may ultimately result in higher material prices. Therefore purchasing effectiveness can never be evaluated in terms of one dimension. In order to evaluate properly, all dimensions should be covered in the assessment. A clear differentiation, by means of mutually exclusive definitions, is hard to give. Quality-costs as a result of defects, do they pertain to the Purchasing Price/Cost or to the Product Quality Dimension? Losses of production, due to late delivery, do they belong to the Purchasing Logistics or to the Purchasing Price/Cost dimension? Sometimes more variables (i.e. quality costs and production losses) may pertain to two or more dimensions.

These dimensions can be measured and evaluated at different levels of aggretation, such as:

- the line-item level and/or the individual supplier level
- the level of the individual buyer
- the departmental level
- the over-all company level, when purchasing's contribution to the company's financial results is being measured

Depending on the level of aggregation, the detail of information required will be different.

7.5. Establishing a Purchasing Performance Evaluation System

In section 7.2 it was noted, that one of the problems involved in evaluating purchasing performance was the perceived lack of formal objectives and performance standards. In that case evaluation of Purchasing activities is a difficult matter.

Performance standards may be arrived at in several ways:

1. through subjective judgment by management
2. through expert-opinion based upon studies and experience
3. through time series analysis
4. through inter-company comparisons.

Botter (1983) suggests to measure the relevant entities consistantly over a longer period of time, to see if acceptable performance standards may be derived from trends that might appear. From this historical data performance standards for effectiveness as well as for efficiency can be established during a longer period of time.

To obtain a systematic performance evaluation of the purchasing function the following steps are recommended:

- it should be established what entities are going to be measured and evaluated; in doing this all those concerned should have a clear and consistent view of the value to do this;
- it should be decided by whom and how frequently measures have to be reported and in what form;
- the entities to be measured should reflect the key-dimensions as suggested when measuring purchasing performance; since it is not possible to grasp them all simultaneously, one should focus on the most important ones;
- all those concerned should understand and agree on how their activities will be reported;
- standards should be derived from time series analysis; this can only be done when a vast amount of historical data has been collected;

- results on performance standards should be communicated and reported; a large time-gap in reporting procedures will affect the usefulness of this procedure in a negative way.

7.6. Additional definitions

Having described the key-dimensions of purchasing control, a distinction now can be made between purchasing performance measurement, purchasing performance evaluation and purchasing control. Although these concepts are related to each other to a high degree, there are some differences, which justify seperate definitions.

Purchasing control is defined here as the process of ensuring that specific tasks are carried out effectively and efficiently. This definition implies that the results of purchasing activities are regularly compared with those intended and that the resources sacrificed are compared with those which were thought to be necessary beforehand.

Purchasing performance measurement is defined as the assignment of numbers to objects or events in such a way that it contributes to better decisionmaking in purchasing. It primarily relates to the comparison of actual with standard performance in a way that is meaningful for the purchasing decisionmaker.

Purchasing performance evaluation finally is defined as the assessment of causes for variances that eventually have been found to exist between actual and planned performance. This definition may also include the search for alternative actions, which may be taken to correct these variances. Although it may be based on quantitative data, purchasing performance evaluation is considered here to be a primarily subjective process, in which purchasing performance is designated in terms of "good" or "bad".

These three concepts have been integrated in Exhibit 7.4. As can be seen Purchasing Control entails Purchasing Performance Measurement as well as Purchasing Performance Evaluation.

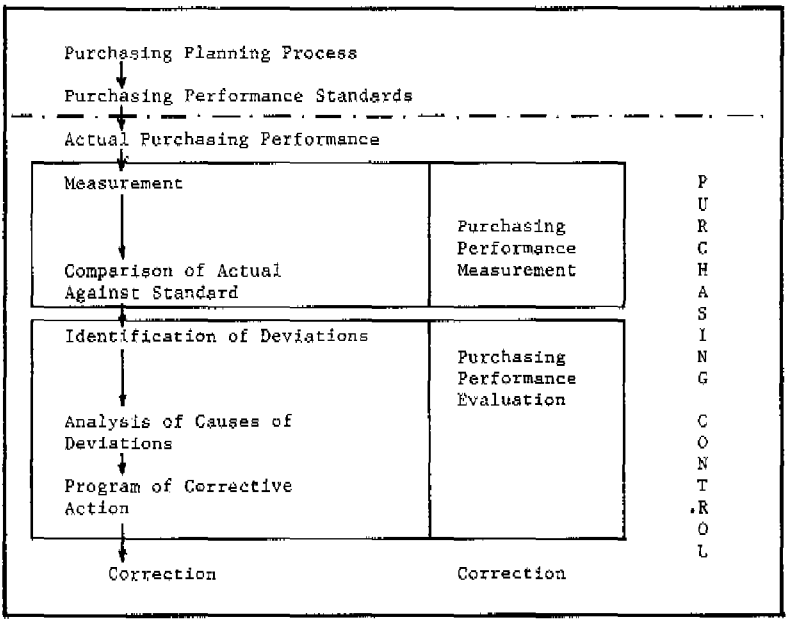

Exhibit 7.4.:
Purchasing Performance Measurement, Purchasing Performance Evaluation and Purchasing Control Interrelated.

7.7. Conclusions

At the end of this Chapter several conclusions can be drawn:

- Purchasing performance evaluation should primarily be conducted to improve purchasing's effectiveness and efficiency; it is felt that this can be achieved best by enabling the buyer to assess the results of his negotiations himself. Purchasing performance evaluation therefore should be directed towards support of the individual buyer in doing a better job;

- The "purchasing climate" and the objectives and responsibilities as assigned by management to the purchasing function, largely affect the character of the measures and techniques which are used to evaluate its performance;

- If purchasing performance evaluation is to serve the purpose of self-appraisal, the buyer needs to participate in the establishment of standards for his activities, he should agree on the devices which are used to monitor variances between actual and planned outcomes, and he should receive information on these variances on a regular basis;

- Standards for evaluation should be established for those areas, for which the buyer can be held responsible. It should be recognized that a buyer has limited freedom, since he is restricted in many respects by market-conditions and internal company regulations. This limits the application of e.g. incentive systems for rewarding buyers.

Since the scope of the purchasing function differs among companies, standards and norms for evaluation cannot be derived from other purchasing organizations. Only when purchasing organizations operate in identical market- and company-environments, some cross-comparisons may be useful.

Notes to Chapter Seven

1. See also Chapter Four of this Study.

2. See also Van Eck, Van Weele and De Weerd (1981) and (1982).

3. In Chapter Two we have commented on this statement that it has primarily operational value; since this study deals primarily with operational control of purchasing we will base the remainder of our discussion upon this statement.

CHAPTER EIGHT: OPERATIONAL CONTROL IN PURCHASING: SOME GUIDELINES

8.1. Introduction

Building upon the ideas as described in the previous chapters, in this chapter more concrete guidelines for evaluating purchasing performance will be provided. In some cases these guidelines correspond with the practices of advanced international companies which we investigated during our study. In other cases we will rely on our own ideas.

First cost-reduction in purchasing and its value for the purchasing practitioner is discussed.

Secondly, the subject of price performance evaluation is discussed. The purpose of this section is to provide a conceptual approach to this subject. Different methods are described and their relationship with product- and market characteristics is highlighted.

Evaluating the quality of incoming goods and materials is a crucial issue, which therefore requires attention. In section 8.4. methods are described by which the purchasing function may contribute to better product quality.

In order to be effective, the requested products and materials need to be available at the right time and at the right quantities. Measuring the effectiveness of purchasing logistics therefore is the core of section 8.5.

This section is followed by a discussion on how to evaluate purchasing departmental performance. A distinction will be made between departmental effectiveness and departmental efficiency.

Finally, some guidelines are presented, which can be used in selecting the most appropriate technique for measuring and evaluating purchasing performance.

8.2. Cost reduction in purchasing (1)

Determining the targets for cost reduction.

For illustrating purposes we follow the purchasing practices of an USA based multinational manufacturing company with production facilities in various countries. In this company the basis of cost-reduction programs consists of the Annual Operating Plans of the Divisions (2). These Plans represent a forecast of the production volume of the Division for the forthcoming fiscal year. From this

forecast the standard production costs can be calculated. As can be expected, as in any industrial company, these costs to a large extent consist of materials costs.

Each year Corporate Head Quarters requires each Division to contribute in terms of cost-reduction. This contribution is specified by a predetermined percentage on production value (say 3%). Next, an allowance is made for inflation to be expected for the coming year. This allowance varies among divisions depending on their product- and production characteristics and their geographical location. As can be expected, this allowance is set rather tight.

Both targets are the starting point for a discussion within each division, in which all functional departments participate. Each department should come up with projects that contribute to the achievement of these targets. In this respect the purchasing department should submit plans, which specify the intended cost-reduction on purchased materials and the inflation figure that is expected for each product or group of products. After a review by Plant Management, these plans are sent to corporate Head Quarters for approval. Approval of these plans, by Corporate Head Quarters implies commitment: the purchasing department from that moment on is carefully monitored and evaluated upon the targets for cost-reduction and inflation (see for a reporting format of cost-reduction Exhibit 8.1.).

Quarter	1979 Objective	1979 Actual	Variance abs.	Variance %	1980 Objective
1	$300.000,=	$427.852,=	$127.852	42.3%	$400.000,=
2	$150.000,=	$188.500,=	$ 38.500	25.7%	$250.000,=
3	$200.000,=	$376.262,=	$176.262	88.0%	$350.000,=
4	$150.000,=	$144.379,=	($ 5.621)	(3.7%)	$300.000,=
Total cost-reduction	$800.000,=	$1.136.993	$336.993	(42.1%)	$1.300.000,=
Total purchasing Volume	$26.179.000	$26.789.192			$28.000.000,=
Savings as a % of Purchasing Volume	3.1%	4.3%			4.6%

Exhibit 8.1.: Reporting Cost Reduction on Purchased Materials (example).

These cost-reductions on purchased materials may be realized through a variety of actions e.g.:

- coordination of common purchasing requirements for several divisions;
- standardization of frequently used and non-expensive purchased items;
- working with distributors for standard, low turnover MRO-items;
- investigating usage of standard materials instead of company designed items;
- reviewing high value items from those areas with high inflation etc.

Defining Purchasing Cost Savings

As we already observed in Chapter Five (see section 5.3.) defining purchasing cost-savings in an unambiguous way often is a troublesome matter. Moreover, it appeared that companies frequently reviewed their definitions. Overlooking the documentation, that we collected on this subject, we can identify some common characteristics in all definitions:

- savings should be achieved by unusual or extraordinary action;
- savings should have a long-lasting effect;
- in order to enhance their credibility within the organization, they should be verifiable;
- only those savings were recognized as true purchasing savings, when they resulted from projects, which had been initiated by purchasing and in which purchasing had played a major role;
- savings should be calculated, considering integral costs i.e. cost-reductions or -increases in other material related areas should be included to prevent suboptimalization.

It is noted here that most companies, using cost-related performance measures, did not differentiate between cost-reduction and cost-avoidance. Cost-reductions were in most cases attributed to those who initiated the projects and through whom they had been realized. These cost-reductions were evaluated against earlier established targets.

Summarizing this section on cost reduction in purchasing, we would like to note the following:

- If purchasing is to contribute to the company's profit objectives, clearcut and well defined targets in terms of cost-reduction and inflation are required.
- Cost-reduction and inflation fighting programs require continuous monitoring

and regular reporting; this requires a fair degree of detail in order to identify what cost-improvements can be attributed to the purchasing function.

More specifically, cost-reduction data need to be corrected for influences resulting from changes in transportation costs and exchange-rates.

- To enhance credibility of the actual savings it is commended that they are be verified by an independent party.

8.3. Price Performance Evaluation (3)

Defining Price Performance

Price Performance is defined as the relationship between the price actually paid and a standard price which serves as a reference. As will be explained, this standard price can be based upon a combination of market factors and cost-factors. Some products react almost entirely to changes in cost factors and others to changes in market factors. Other products react to changes in both cost and market factors. The following examples illustrate these three cases.

- For plastic components, the price modification can be attributed almost completely to a change in the cost factors. For example, an increase in labor costs will lead to a proportional price-increase.
- For copper, the price paid is almost completely determined by the market situation, and cannot be influenced by the individual buyer. For instance, if economic activity declines, market circumstances will change and the price will fall. Clearly, the purchase price for derivative products is strongly related to the market price for the raw material.
- For petrochemical raw materials, the sum of the cost factors is about the same as the sum of the market factors. In other words, the ultimate market price is determined both by cost elements and by general market conditions.

The classification described here agrees to some extent with the concepts discussed by Raymond Corey (1978), who considers prices to be based essentially on three different models: (1) the cost-based price model; (2) the market-price based model; (3) the competitive-bidding model. In the last model, prices between the buyer and the seller are set on a competitive basis.

With regard to the standards, that can be used to measure and evaluate purchasing price performance a distinction can be made between those, which are stated in an absolute way (such as actual pricedata) and those that are stated in the form of some index.

Examples of the first group are:

- Indicative prices: Examples are unofficial market prices, suggested list prices, and catalog prices. However, due to their general character, such prices cannot readily serve as standards for purchasing price evaluation.
- Quotations: A comparison of various quotations reveals whether the buyer is paying too much; however, a real standard is in fact not created.
- World Market Prices: These can be measured quite precisely, but experience and knowledge are required to handle them accurately and effectively. Moreover, these prices typically cannot be influenced by the individual buyer.
- Normative Standards: These data are derived from cost-breakdowns and total commodity cost analysis techniques as described in current purchasing literature (4). It is clear that standards based on careful application of these techniques provide the best possibilities for evaluating purchasing price performance objectively.

Examples of standards, that are expressed in the form of an index are:

- Company Indices: An index can be calculated based on a package of products purchased by a certain buying group. This index can then be compared with an index of a similar package of goods purchased by another group. The lowest index figure can subsequently be taken as a standard for the assessment of the performance of other buying groups.
- Government Indices: Governmental institutions periodically provide information on price developments of specific products and product groups. This information relates primarily to average producer prices and to export prices, which not necessarily have to apply to an individual company; therefore these indices are not recommended for use as a standard for price evaluation.
- Indices for Cost Price Components: For certain groups of selected products (such as the A items in an A B C product classification for purchased materials), cost price analysis is recommended. As an example, suppose product group X has the following cost price structure:

raw materials	= a%
wages/salaries	= b%
energy	= c%
miscellaneous	= d%
	100%

Selection of the standard

Which of the standards described should be applied in a specific situation? The answer to this question depends on the following factors:

- The method of "price setting" for the materials that are purchased (cost, market, or a combination of the two).
- The characteristics of the purchased materials and services, that are purchased.
- The operating costs involved in the application of a specific standard.

A relationship between the method of pricing and the standards described above is hypothesized in Exhibit 8.2. In the case that prices of materials are primarily based on cost factors, application of normative prices and indices of cost price components is the preferable approach to use in evaluating the prices paid. If, on the contrary, the price of purchased materials and services is set primarily determined by supply and demand, published market prices and government indices should be used as prime measures for evaluation.
Further we assume a relationship between the method of price setting and the type of materials purchased. This relationship is depicted in Exhibit 8.3. (5). Raw materials and semi-manufactured products are traded mainly in a relatively free markets and in large quantities. The price, that has to be paid a certain moment strongly depends on the market conditions at that point in time.
As far as component products are concerned, one must differentiate between components made to the supplier's specification (standard) and those made to the customer's specification (non-standard). In the latter case, the buyer will precisely know the cost of the material to be purchased; in the former case, the buyer can only obtain a rough indication of the product's cost through market research, i.e. through comparison of quotations of various suppliers. For this reason, prices for non-standard components typically are determined on the basis of competitive bidding or negotiation. What just has been said about non-standard components, also applies, for the most part, to finished products.

MRO products comprise such a heterogeneous group of materials that no general statement can be made about the methodology utilized in setting prices for these products. Their prices are determined neither by market circumstances alone, nor on the basis of cost factors only. Rather, their prices are determined by a combination of the two.

The most heterogeneous group, however, is that comprised of the services. The price for services usually can be based on cost, assuming that the activities, that need to be performed, have been specified with precision and that the hours and hourly rates have previously been agreed upon. For cases such as software design and implementation, however, the price typically is based on market factors. In this case, the cost structure is so difficult to determine and the demand so large, that the price as quoted by the firm usually must be paid.

Based on the material contained in Exhibit 8.2. and 8.3. it is now possible to indicate under what conditions the standards, that were identified, can be applied. For this purpose, a "decision matrix" has been developed, which is illustrated in Exhibit 8.4.

This exhibit shows that the price-measures that should be used to evaluate price performance depend on the method of pricesetting and product-characteristics. For example, since raw materials prices are primarily determined by factors relating to the supply/demand situation, standards should be derived primarily from indicative prices, quotations, world market prices, and government indices. For non-standard components, however, we see a different situation. Because this type of product is made according to customer specifications (with a reasonable idea of product cost), the supplier's price can be assessed more easily by making on a cost estimate. In this case, standards can be derived from the indices of cost components and pre-calculated cost estimates.

A final consideration in the selection of a price performance measure focuses on the costs involved in applying the standard. As noted earlier, the identified measures vary widely in terms of their level of sophistication. The application of one standard may therefore require more research and more effort than another. In general, the more complex and more detailed the selected measure is, the higher the costs will be for gathering the necessary information and keeping it up to date.

RELATIONSHIP BETWEEN TYPE OF STANDARD AND METHOD OF PRICE SETTING

Method of "price setting" \ Type of standard		Indicative prices, quotations, company indices,	Market prices, government indices,	Normative standards, indices for cost price components,
Primarily based on cost factors				X
Based on cost as well as on market factors	With the emphasis on cost factors	X		X
	50/50	X	X	X
	With the emphasis on market factors	X	X	
Primarily based on market factors			X	

Exhibit 8.2.: Relationship between Standards Used and Method of Price Setting.

RELATIONSHIP BETWEEN VARIOUS PURCHASE PRODUCT GROUPS AND METHODS OF PRICE SETTING

Purchase product group \ Method of "price setting"		Primarily based on cost factors	Based both on market and cost factors			Primarily based on market factors
			With the emphasis on cost factors	50/50	With the emphasis on market factors	
Raw materials					X	X
Semi-manufactured goods				X	X	
Components	Standard		X	X	X	
	Non-standard	X	X	X		
Finished products		X	X	X		
M.R.O.			X	X	X	
Services		X	X	X	X	X

Exhibit 8.3.: Relationship between Various Purchase Product Groups and Methods of Price Setting.

DECISION-MATRIX

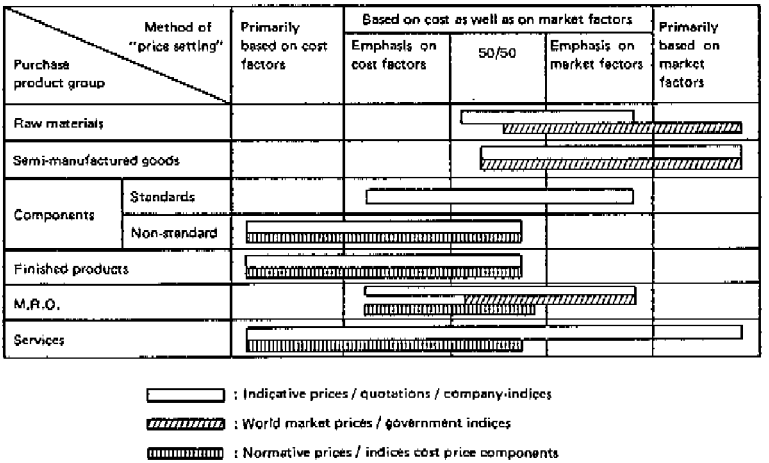

Exhibit 8.4.: Selection of Performance & Standards Based Upon Method of Price-setting and Product Characteristics.

The basic ideas discussed in this section have been summarized in Appendix 4.

8.4. Purchasing's Contribution Towards Product Quality

When measuring the quality of purchased materials, it has been suggested earlier in this study, that the purchasing function has two important responsibilities. These responsibilities relate to:

- purchasing's contribution to the product development process (sometimes designated as "purchasing engineering")
- assuring that the incoming materials and services exactly meet the requirements, as communicated to the supplier.

8.4.1. Purchasing's Contribution in the Product Development Process

During our interviews with purchasing practitioners of Dutch companies, purchasing's role in the product-development process appeared to be rather small. That this sometimes can lead to significant problems, was illustrated by one purchasing manager who reported that after the successfull development of a promising

new product, one important component could not be sufficiently supplied. As a consequence introduction of this product had to be delayed for 16 months, until purchasing had found a supplier, who was willing to invest in production capacity for this component. This problem would not have occurred, stressed this manager, if purchasing had been involved earlier in the product- development process. From our experiences with buyers of many industrial companies, we have the impression that these problems are common in many companies and industries. The consequences of these problems are schematically depicted in Exhibit 8.5.

This Exhibit illustrates that:

- product specifications are becoming more and more determined, as time elapses during the product-development process; at the initial stage many alternatives as to the materials to be used may be open, whereas at the final stage product-design is very difficult to change;
- costs, associated with changes in design or material specification increase, as the product-development process proceeds; after the product is introduced, changes in design can only be made against high costs;
- purchasing's flexibility for suggesting new suppliers, alternative materials, substitutes etc. decreases as product-development time continues; at the end of the development stage suppliers and materials are specified by engineering, and hence purchasing's room for negotiation is limited.

The relationship between product-development, purchasing and cost-patterns is increasingly being recognized. Some companies, which we have visited, created a special function for these activities in purchasing, which was often designated as Purchasing Engineering. A purchasing engineer's task was primarily to conduct market-research on purchased parts for prospective new products. More specifically the following considerations were stated in support of this specialization.

- It enables purchasing to investigate at an early stage to what extent purchased parts, which are required for the new product, are available in the market; it enables to screen promising suppliers timely in advance.

- Early involvement may result in product-, materials- or design- alternatives to be suggested by purchasing. Purchasing engineers may sollicit suppliers for finding solutions on certain technical problems, which might occur.

Furthermore these specialists may provice cost-analysts with valuable information on costs and future market trends.

- Specialization within purchasing is in some circumstances required to be able to keep up with the technical knowledge and expertise of product-engineering.

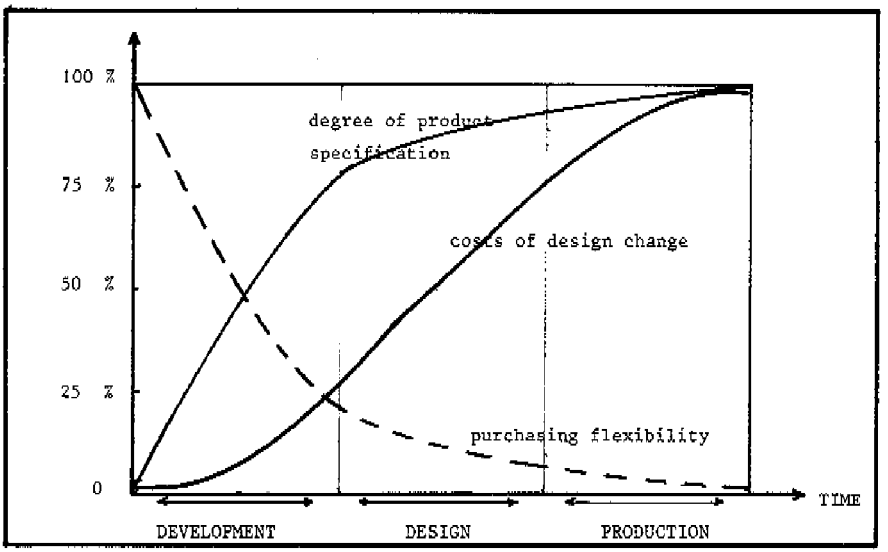

Exhibit 8.5.: Product Design Related to the Product Development process.

In some companies a growing gap was experienced between engineering people and buyers on the issue of technical competence. Due to rapid technological developments in some areas, buyers were not able to discuss technical matters in sufficient detail with product-engineers. Furthermore, sourcing for new products in general was a time consuming activity, which appeared difficult to combine with the buyer's daily operations (6).

Having conducted our research, we have the impression that a large gap exists between practice and theory. When purchasing performance evaluation is discussed in literature, purchasing's involvement in product-development processes is not touched. In our opinion, this area is an important part of purchasing's task and therefore should be included in any performance assessment. However, we are aware that a clear and objective measurement of this area is a difficult matter,

since it lends itself not easily for quantification. Which does not imply, that it is impossible. Insight as to the performance of purchasing in this respect, may be derived from such issues as:

- how much time is spent by the purchasing department on new product development projects or value engineering/value analysis projects;
- to what extent is purchasing involved in new product development; in how many of the projects does it participate?
- what ideas for product changes or material substitutes have been suggested by the purchasing department; how many have been implemented?
- how is the purchasing department perceived by other departments in terms of technological competence and innovativeness?
- what did purchasing contribute in terms of cost-reduction or quality improvement through analysis, introducing new sources of supply, suggesting alternative materials etc?

8.4.2. Purchasing's Contribution in Buying the Right Quality.

When materials specifications have been established, the purchasing function should see to the fact that the purchased materials are delivered accordingly. Since the purchasing function to a large extent is responsible for supplier selection, it is argued here that purchasing holds an important responsibility for assuring the right quality. Therefore measuring the quality of incoming materials is an important part in the overall purchasing performance evaluation.

Product-specifications should be stated in objective terms; they should not reflect a preference for a certain supplier. Every industrial buyer should therefore be alert that in technical drawing and specifications no reference is made of certain supplier product-codes or specific brand or product names. Depending on the circumstances, purchasing problems with regard to quality can be classified as follows:

Delivery is \ Formulation of specifications is	Correct	Not correct
According to specifications	A	B
Not According to specifications	C	D

This scheme requires some explanation:

situation A: This situation does not pose special problems.

situation B: In this situation the supplier delivers according to specifications. However, the product cannot be used due to unsatisfactory specifications. In this case the engineering department should have provided for unambiguous specifications.

situation C: Quality problems in this situation occur through the fact that the supplier does not meet the required specifications. This may be due to wear-out of production molds, inaccuracy etc. This kind of problems could - to some extent - be attributed to the purchasing function, which perhaps should have been more careful in selecting the vendor and/or monitoring his performance.

situation D: Similar comments as has been made in situation B and C, also apply here. To some extent quality problems may be attributed to the purchasing function.

Whether the purchasing function is responsible for quality problems of incoming goods, depends on the type of situation (i.e. B, C or D-type). It also depends on the extent to which the purchasing function has been involved in evaluating the specifications.

Another area of concern in this respect is formed by quality defects of purchased parts, which occur during the life cycle of the end product. Information on these failures, may be extremely important for products with a long life time such as airplanes, trucks and vessels. As one respondent put it during one of our interviews:

"The ultimate test of the quality of purchased goods is determined by their actual use and functioning in the end product". Complaints on quality failures need to be fed back to the buyer and engineer, who then can take corrective action.

In order to improve supplier quality performance, regular information is needed on:

- the number of quality problems registered; i.e. a quality rating assigned by quality control, based upon the number and type of quality problems for each supplier for a given time period;
- costs associated with defective quality; such as costs resulting from rework and repair, scrap, return to supplier, assorting etc.

These data may be reported per supplier, buyer, product group, etc. and may be expressed in absolute terms as well as in percentages.

In case of variations between actual and desired quality performance, the buyer can take the following correcting measures:

- inform the supplier of the malfunctioning of his products;
- go and find alternative sources of supply, if the present supplier is unable to solve the problem;
- consider modification of specification together with the engineering department, if no other source of supply can be found.

Of course the question rises, what deviation or quality failure is acceptable? In our opinion no general answer on this question can be provided. The standard against which quality has to be evaluated depends on:

- the performance of a specific supplier in the past
- the supplier's technical competence and experience in manufacturing the product
- the product's technical complexity
- the supplier's quality control procedures and organization etc.

Since suppliers will differ on these criteria, norms and quality performance also differ. However, registering quality performance of a specific vendor within a specific product class enables comparison with other vendors and may elicit a specific vendor's capabilities.

At the end of this paragraph we would like to observe that in many industrial companies new philosophies are introduced in the related areas. These philosophies represent a new approach towards materials requirements planning and are aimed among others, at reducing inventories whilst preserving flexible production operations. These philosophies are often designated as Just-In-Time-Production, KANBAN, Manufacturing Resources Planning etc. These new philosophies will influence supplier-relationships in a significant way. Supplier-quality performance will become more and more crucial to efficient production operations (as will supplier-service be, which is discussed in the next paragraph). For example, operating under these new materials management philosophies requires zero- quality defects from the supplier. The implications of these philosophies will be discussed in more detail in Chapter Nine (see section 9.5.).

8.5. Purchasing's Contribution Towards Controlling the Materials Flow

Purchasing's contribution towards controlling the material flow consists of three parts (7):

- control of timely submittal of purchase requisitions;
  this refers to the monitoring how timely purchase requisitions are submitted to the purchasing department; it also refers to how fast these requisitions are handled through the purchasing department;
- control of timely delivery; this refers to:
  - informing other departments on the actual lead-times which should be considered in requisitioning materials;
  - regular check of supplier promise dates;
  - correcting suppliers when deliveries are due;
- control of quantities delivered; this implies
  - regular contact with the incoming materials department to see if the quantities delivered meet the quantities ordered;
  - control of partial deliveries;
  - corrective action when variances between the quantities ordered and quantities delivered occur.

What methods can be used in purchasing to control the incoming materials flow? Generally, three methods of expediting can be mentioned (Kudrna (1972) p. 45).

1. Exception expediting. This is the most typical method applied by purchasing

departments. It consists of calling a supplier to obtain a revised promise date only after the original promise date has been missed.

2. Routine status check. This is a much more time consuming method, but it prevents upleasant surprises. This method consists of calling suppliers at preset intervals so that they are able to inform production planning of (potential) schedule delays at the earliest possible moment. This method offers an opportunity for working around a late delivery rather than suffering through it.
3. Advance expediting. This is the most intensive and therefore most time consuming method of all. It attempts to assure supply instead of just providing a warning of late deliveries. This method consists of using milestone-, critical path-, or similar scheduling techniques that identify critical steps in the supplier's manufacturing process. It enables the buyer to review these progresses against the schedules. It identifies potential delays and it allows the buyer to take necessary corrective action to insure timely delivery. This expediting method is the most costly one and it therefore should be applied selectively. It is usually applied, when buying expensive equipment that requires punctual delivery (e.g. construction, ship building).

The actual use of one of these methods will depend on various factors, such as:

- the strategic value of purchased products;
- delivery reliability of vendors;
- man capacity in the purchasing department;
- sophisticatedness of the purchasing information system.

Deciding what method to be used in what situation requires some explanation, which is provided in section 8.6. of this Chapter.

An overview of the various measures, that can be used to monitor the purchasing material flow, is presented in Exhibit 8.6.
As this Exhibit shows, measures for controlling the purchasing materials flow can be divided in three groups. Each measure can be represented in terms of physical quantities, dollar-value, etc. Further, they can be expressed at different levels of aggregation such as line item, product-group, supplier and buyer.

Type of measure	Unit of measure	Expressed per
1. Control of timely submittal of requisitions		
. requisitions	absolute,	buyer,
. open requisitions	percentage,	supplier,
. purchase orders	volume,	line item,
. line items	dollars	product-group
. dollars committed		
. change notices		
. contracts written		
. open dollar commitments		
. worker hours		
. administrative dollars		
. administrative leadtime		
2. Control of timely delivery		
. open purchase orders	absolute,	buyer,
. early shipments	percentages,	supplier,
. past due orders (delinquent, critical)	volume, dollars	line-item, productgroup
. rush-orders		
. supplier promise date		
. supplierlead time		
. supplier delivery date		
. changes in promise date (initiated by vendor or buyer)		
. purchasing need date		
3. Control of quantities delivered		
. quantities ordered	absolute,	buyer,
. quantities received	percentages,	supplier,
. partial deliveries	volume,	line-item
. over-deliveries	dollars	product-group
. shortages		

Exhibit 8.6.: Measures for Controlling Purchasing's Materials Flow

As will be clear these measures should be used selectively. They will be most useful for the most critical products and the most problematic i.e. unreliable vendors.

8.6. Measuring and Evaluating the Purchasing Organization

Measurement and evaluation of the purchasing organization poses some problems:

- many aspects of departmental performance are difficult to grasp and cannot be measured in an objective way;
- due to the fact that purchasing performance often is a shared responsibility, a direct causal relationship between effort and performance is difficult to establish; setting objective standards therefore is a specific problem;
- when evaluating departmental performance also the other three dimensions should be considered;
- a distinction between departmental effectiveness and efficiency is difficult to make, since means and ends are often not easy to distinguish.

It is argued here that effectiveness as well as efficiency should be considered in assessing the purchasing organization. In this respect some indicators are discussed in section 8.6.1. Where a direct relationship between input and output is difficult to establish, the purchasing audit may be helpful. This technique is discussed in section 8.6.2.

8.6.1. Some Indicators for Departmental Performance

In this section two types of indicators are discussed i.e. those relating to departmental effectiveness and those relating to departmental efficiency.

Indicators for departmental effectiveness compare actual results with planned results. These results may be defined at the departmental level, as well as at the individual level. In this respect the following indicators are suggested.

1. Actual cost reduction vs. planned cost reduction: if this ratio is 1.00 purchasing has exactly met its targets. If this ratio is less than 1.00, evaluation may lead to the following conclusions
   - the targets have been set realistically, but something went wrong in executing the plan;

- implementation proceeded according to schedule; however, the cost reduction potential had been overestimated; targets were set at unrealistic levels.

2. Share of purchased materials and services in the end-products cost price (8). The present turnover ratio may be compared with:
   - the past figure;
   - a previously made estimate;
   - ratio's of companies operating in the same industry (9).

   It is noted here that this figure should be adjusted for currency changes, which are wholly beyond control of the purchasing department. This indicator may provide information on:
   - the extent, to which purchasing prices have changed relative to other cost-elements (such as labor, raw materials, energy)
   - the developments going on in purchased materials cost
   - the company's position with regard to the purchasing turnover relative to other companies (10).
3. Price Performance Measures. The Purchasing Materials Budget provides an excellent tool for monitoring purchasing price performance in a general way. However, for some important materials more detailed information may be necessary (see section 8.2. and 8.3. of this Chapter).
4. Purchases from new suppliers. This may indicate to what extent the purchasing function introduced new suppliers. A distinction may be made between:
   - new vendors for existing materials and services;
   - new vendors for materials and services, which were purchased for the first time.

   Each year a target may be set to procure a certain percentage of total purchasing expenditure from new vendors.
5. Purchases from single and sole sources. Sole sources refer to items which can be supplied only from one supplier. This concept refers to actual monopolistic suppliers. Examples are gas and energy, which often only can be supplied from governmental institutions, spare parts to be supplied from OEM's (11). Single sources refer to items that are sourced from only one supplier, whereas more potential suppliers actually exist.

Purchasing departmental efficiency refers to the extent to which activities are conducted against the most economical conditions. The following indicators in this respect are suggested.

1. Indicators relating to purchasing departmental workload:
   - number of codenumbers vs. number of purchasing employees; following this ratio over time may provide insight in changes in workload;
   - purchasing turnover per purchasing employee; this indicates trends in commercial responsibilities;
   - time-measurement; regularly, a survey should be made to see how each individual buyer spends his time; a distinction is suggested between the following activities;
     - purchasing research
     - internal communication
     - negotiations with external parties
     - inventory control
     - administration
     - purchasing management
     - miscellaneous (e.g. education).

2. Indicators relating to the purchasing materials flow:
   - number of purchasing requisitions per buyer
   - number of purchasing orders per buyer
   - number of backlogs per buyer
   - number of late deliveries per buyer/vendor
   - average purchasing administrative leadtime
   - percentage rejects per buyer/vendor

3. Indicators relating to the purchasing departmental budget:
   these indicators compare actual costs with planned costs for several cost-categories (e.g. wages and salaries, telephone and mail, computertime, computerdevelopment, travel-expenses).

It is noted here that in evaluating purchasing departmental performance, indicators for effectiveness as well as efficiency should be considered. Measuring departmental performance by evaluating operational costs, makes no sense if no attention is given to the results, which were realized by this department. Furthermore, when input and output variables are related to each other, this only makes sense when there is some form of causal relationship between these.

8.6.2. The Purchasing Audit

Since current purchasing literature is fairly scarce on this subject, we have based our discussion on ideas which were developed by some marketing authors (e.g. Kotler, Gregor and Rodgers (1977)) and the practices of some large multinational companies (12).
Similar to the marketing audit, the purchasing audit may be defined as:
"a comprehensive, systematic, independent and periodic examination of a company's purchasing environment, objectives, strategies and activities with a view of determining problem areas and opportunities and recommending a plan of action to improve the company's purchasing performance".

Based on this definition the following characteristics may be assigned to the purchasing audit.

- It is broad, rather than narrow in focus. It covers many areas of the purchasing function. However, depending on its objectives, the purchasing audit may be narrowed down to a specific area (e.g. the purchasing information system).
- A purchasing audit consists of an orderly sequence of diagnostic steps
- The purchasing audit is not a one-time event; it should be conducted periodically.

It is important to note that there is no performance evaluation involved in the audit. Purchasing operations could be audited yearly for conformance to established purchasing procedures and normally accepted business practice.
Furthermore the audit should be conducted by someone who is independent of the purchasing department. In general two alternatives exist in this respect:

- internal audit: the audit is conducted by specialists belonging to the company e.g. a specialist from the accounting department or members from Purchasing's Central Staff Department;
- external audit: in this case the audit is performed by an external consultant.

In general, conducting a purchasing audit requires, three important aspects:

1. Agreement on objectives, scope and approach. Questions to be covered here are:

- what purchasing departments will be involved in the audit?
- what activities will be focused at? What depth is required?
- What data resources will be covered?
- How will the results be reported?
- What time is taken for conducting the audit?

These questions should be answered against the background of the objectives of the audit which may refer to:

- assuring that sound purchasing practice is followed;
- assuring that prices paid for materials and services are the lowest consistent with quality and delivery requirements;
- taking notice of advanced or improved purchasing practices which contribute to lower purchasing cost.

2. Gathering the data. An important rule in data collection is not to rely solely for information on those being audited. Interviews with specialists from other departments and outside vendors may provide interesting data. Often a lack of consonance will appear between what buyers say they want, what supplier salesmen are responding to, and what materials planners are emphasizing.

3. Preparing, and presenting the report. Visual and verbal presentation. The most valuable part of a purchasing audit often lies not so much in what auditors recommend but in the process that management starts going through to assimilate, debate and develop their own concept of the needed actions for improvement.

We suggest that a purchasing audit should primarily be used for a thorough analysis of the Purchasing Department. Also it could be used in those situations in which a direct causal relationship between efforts and performance is difficult to establish. Instead of measuring the results, the purchasing audit should verify to what extent activities were carefully prepared and properly executed. The reasoning behind this is that if procedures have been properly followed this automatically should lead to an optimal performance.

What should be included in a purchasing audit? The Institute of Internal Auditors (1959) suggests the following areas.

- Organization Structure. Does it provide for, and to what extent does it

insure, effective operation and control?

- Cooperation and coordination with other Departments. Is full use being made of purchasing department is knowledge of markets, materials and processes?
- Relationship with Vendors. Are good supplier relations maintained so that the company can gain from the specialized knowledge and the suggestions of suppliers? Are there adequate records to justify supplier selection and price paid? Is reciprocity involved? If so, is it handled to the benefit of the company?
- Procedures and Routines of Purchasing. Are they effective and economical? Are they understood and followed by all purchasing staff members?
- Make-or-buy. Could products now being made by the company be purchased to advantage or vice versa?
- Records and Reports of the Purchasing Department. Do they provide adequate information for operating personnel and for management? In particular, do they reveal exceptions from the normal pattern?
- Policies. Once established, are policies used? Should they be revised? If so, what are the alternatives recommended and why?

In conducting the audit the following problems may arise:

- the objectives of the audit often are based upon a priori notions of what the key problem areas are for the audit to highlight; it is possible that once the auditor begins to learn more about the company, new problem-areas emerge;
- it may be necessary for the auditor to use different sources of information than foreseen;
- when conducting the audit purchasing employees may feel threatened;
- the executive, who brought in the auditor, may try to guide him;
- the results of the audit may not live up to the expectations.

For coping with these problems, several measures should be taken:

- the original set of objectives should not constrain the auditor from shifting his priorities of investigation;
- the auditor should guarantee and maintain confidentiality of each individual's comments;
- there should be open and frequent lines of communication between management and auditor to prevent that conflicts arise;
- the report should provide in priorities and directions of improvement.

8.7. Cost Benefit Analysis or: Where to Put the Emphasis?

In deciding what techniques should be applied under what circumstances the Purchasing Product Portfolio Matrix, which has originally been suggested by Kraljic (1981) may be a helpful device. This matrix is presented in Exhibit 8.7. As can be seen two criteria are used for assembling this matrix i.e. supply risk and commercial risk. These criteria require some explanation. Supply risk may be determined by the following factors:

- Characteristics of the purchased products. Standard products which can be purchased from many sources usually cause little supply problems. This may be different for some special, customer made electronic components, which need to fit narrow technical tolerances.
- Geographical distance. When a product is supplied from a foreign country, regular supply may be hampered by traffic congestions, customs regulations, or political instability.
- Scarcity. Products which are in short supply (structurally or temporarily) and/or which are being sourced from one supplier have a greater supply risk than those which can be sourced from other suppliers.
- New-supplier. Change to a new supplier may also cause some supply risk since the customer does not have previous experience to rely on. Of course this risk should be minimized by thoroughly researching in advance the supplier's capabilities.

Products with a high supply risk should be identified due to their immediate influence on production materials planning i.e. production scheduling.

Commercial risk may be determined by the following factors:

- Profit Impact. Purchased products are considered to have a large profit impact if they constitute a large share in the cost-price of the company's end product. For instance contra-weights for a forklift-truck are very expensive items and they therefore have a large profit impact. Office-supplies, on the other hand, usually constitute a minor part of the purchasing turnover and they therefore have a low profit impact and, consequently, a low commercial risk;
- Ability to forecast prices. When prices of purchased products are difficult to forecast, these materials are considered as having a high commercial risk; if they can be forecasted with some accuracy and in a relatively simple way, the commercial risk is considered to be low.
- Volume. Some products, although they may constitute only a minor part in the

end products' cost price, may have a high commercial risk due to the amount of money involved. As an example capital equipment may be mentioned.

COMMERCIAL RISK	SUPPLY RISK	
	HIGH	LOW
HIGH	Strategic Products . oil derivates . metals . capital equipment	Leverage Products . electric motors . EDP-hardware . capital equipment . heating oil . subcontracts
LOW	Bottleneck Products . catalyst materials . metals . outside services	Normal Products . cool . office suppliers . standard components . maintenance, repair and operating supplies . minor equipment and tools

Exhibit 8.7 Purchasing Product Portfolio Matrix (adapted from Kraljic (1982))

In the Purchasing Product Portfolio Matrix four product categories are identified, i.e.:

- Strategic purchased materials: those products which represent a high commercial risk and a high supply risk; examples are capital equipment, some raw materials;
- Bottleneck products: these represent products with a high supply risk and a moderate to low commercial risk; examples are related to specific company circumstances;
- Leverage products: products which represent a high financial amount and which can be supplied from many sources; cost-reductions for these products may lead to significant cash-improvements; examples are subcontracting-agreements, capital equipment;

- Normal products: these products do not cause - under normal conditions - any problems in supply; neither do they represent large financial interests; examples are standard components, maintenance, repair and operating supplies and tools and minor equipment.

Due to the labor-intensive and time-consuming character of some of the techniques, that have been discussed, we think that these should be applied selectively. In this respect we suggest the Purchasing Product Portfolio Matrix as an useful instrument. An attempt to differentiate the various purchasing control techniques is presented in Exhibit 8.8. Depending on the strategic importance of the product that is purchased, different techniques are suggested.

Importance Dimension	Strategic Products	Leverage Products	Bottleneck Products	Normal Products
Price/cost	. cost-reduction . price-measurement	. cost-reduction . price measurement	. purchasing materials budget	. purchasing materials budget
quality	.purchasing engineering . quality index	. purchasing engineering . quality index	. purchasing engineering . quality index	. accepted quality level
logistic	. advance expediting	. status routine check	. advance expediting	. exception expediting
Organization	⟷ Purchasing Departmental Budget ⟶ ⟵ Purchasing audit ⟶			

Exhibit 8.8. Purchasing Control Techniques Related to Purchasing Dimension and Strategic Importance.

As can be seen from this Exhibit Cost Reduction Measures and Price Performance Measures should primarily be applied to Strategic and Leverage products, due to the profit impact that these products may have and their financial implications. Purchasing engineering could be used for the same reasons. As experiences with Purchasing engineering have shown (13), purchasing involvement at an early stage in the product development process may lead to significant cost savings. Therefore this technique is suggested for Strategic as well as Leverage Products. It is also suggested for Bottleneck Products as working with several suppliers may enhance independence in sourcing policies.

With regard to the Logistics Dimension, advanced expediting is suggested for Strategic products as well as Bottleneck Products, due to the high supply risk that is associated with these product categories. For Leverage and Normal Products the Status Routine Check resp. the Exception Expediting technique are suggested.

Finally, the purchasing departmental budget and the purchasing audit are suggested to measure and evaluate organizational effectiveness and efficiency.

Notes to Chapter Eight

1. This section has been inspired by the purchasing practices of leading American multinational companies, which in most cases have production facilities in The Netherlands.

2. Division and operating plant are used interchangeably: we are aware that in reality they may represent different entities.

3. This section has been largely based upon Ven Eck, A., Van Weele, A.J., and De Weerd, H., "Price Performance, Evaluation: A Conceptual Approach", Journal of Purchasing and Materials Managment, Summer 1982, pp. 2-9.

4. See Kudrna (1972).

5. See for a definition of the various product categories Chapter Two of this study.

6. Similar considerations have led companies to differentiate between product-management in their end-use market strategies: product- management in fact originated due to the fact that it appeared not compatible with the daily sales-operations.

7. Depending on the circumstances inventory control might be mentioned as a fourth responsibility area; however, since it is not considered as a prime purchasing responsibility, this subject is not further discussed here.

8. Purchased materials cost may also be expressed relative to sales; however, endproduct cost is here preferred, since market conditions, which may affect profit-margins, are eliminated.

9. Samenvattend overzicht van de Nederlandse Industrie, as published by the Central Bureau for Statistics, may provide some interesting information.

10. Recent studies (see Buzzell (1983)) have provided interesting information concerning

the purchasing turnover ratio and overall competitiveness; it is suggested that companies with a lower p.t.r. generally are more profitable.

11. OEM stands for: Original Equipment Manufacturer.

12. See Faes, De Rijcke and Van Weele (1982).

13. See "Purchasing Planning and Techniques", Internal Report, General Electric Company, 1980.

CHAPTER NINE: SUPPLIER PERFORMANCE EVALUATION: CONCEPTS AND TECHNIQUES

9.1. Introduction

Although supplier performance evaluation has not been covered by our empirical study, we found that our study on purchasing control would not have been complete without discussing it. In literature, selection of suppliers often is referred to as a key decision area in the purchasing management process (see Chapter Two). Furthermore we think that the role and importance of supplier-networks to industrial companies are changing due to:

- introduction of computerized materials requirements systems, which require better customer service and supplier-discipline (1);
- rapid technological developments in some industries, which require more participation of suppliers in product development processes (2);
- pressure on end product costs, which often leads to a more agressive attitude towards suppliers, who should contribute to cost-reductions (3).

Suppliers, to a large extent, affect purchasing departmental effectiveness and efficiency. This warrants to our opinion a discussion of how supplier- performance should be assessed.

For this discussion some arrangements should be made concerning the terminology, which we will use. A problem is that each author seems to use his own definitions.

When discussing supplier performance evaluation, a distinction is made here between supplier evaluation and supplier rating (4). Supplier evaluation relates to the systematic evaluation of a supplier, based on his historical or expected performance. In general, the following factors are considered when evaluating existing and prospective suppliers:

- quality performance, which relates to the features and characteristics of the design, that is required by the buying company as well as to the extent as to which the supplier succeeds in meeting the customer's required specifications;
- price performance, which relates to how competitive the supplier is concerning price;
- delivery performance i.e. the extent to which orders are being delivered on time and in the required quantities;

- service; this factor includes all aspects that make for good relations between buyer and seller.

These factors may be expressed in quantitative terms. This quantification of supplier performance often is referred to as supplier rating. It is a more limited form of supplier-evaluation, which always includes non-quantifiable factors. In Exhibit 9.1. we have listed the major differences between supplier evaluation and supplier rating.

Aspects	Supplier Evaluation	Supplier Rating
. Orientation	Future oriented	Based on historical data
. Applied to	New/Existing suppliers	Existing suppliers
. Character	Mainly qualitative	Mainly quantitative
. Scope	Broad, many aspects considered	Narrow, few aspects involved
. Effort	Time consuming	When data available easy to conduct
. Data Processing	Subjective, human factor needed	Factual, may be computerized
. Supplier assistance	Suppliers should cooperate when collecting data	Factual data can be derived from own company records

Exhibit 9.1.: Supplier evaluation and supplier rating compared.

Since supplier rating systems rely mostly on historical data, they can only be applied to existing suppliers i.e. those, which are familiar to the company. Supplier evaluation, however, can be used for potential suppliers as well as for existing ones.

9.2. The Supplier Selection Decision

In a survey which was conducted in 1966, Dickson (1966) discovered 23 different factors, which are considered in evaluating (potential) suppliers.
As can be seen from Exhibit 9.2. quality, delivery, performance history, and warranties and claims policies were perceived as of extreme importance. A major comment on this listing can be that it is very general in nature, since it does not relate to specific supplier characteristics, characteristics of the products purchased and type of buying situation. When Dickson investigated the ranking of these factors for specific products (i.e. paint, desks, computers, and artwork) he found considerable differences. Clearly the characteristics of the product purchased influenced the ranking of importance of these factors. However, since Dickson's research was only limited to four products no general guidelines could be developed.

A more sophisticated approach on this subject was provided by Lehmann and O'Shaughnessy (1974). The major purpose of their study was to determine how the choice criteria used by purchasing agents to select suppliers varied with the type of problem, that was likely to arise in adopting a particular product.
Differences in the degree of importance attached were examined among the choice criteria as used by industrial buyers. Four product types were identified:

Routine Order Products: products that are frequently ordered and used; this kind of products was assumed to have very little risk involved.
Procedural Problem Products: the buyer is confident that the product will do the job, however problems are likely because personnel must be taught how to use the product.
Performance Problem Products: there is doubt as to whether the product will perform satisfactorily in the application for which it is being considered.
Political Problem Products: there is likely to be difficulty in reaching agreement among those affected if the product is adopted.

Factor		
Quality	3.508	Extreme
Delivery	3.417	Importance
Performance History	2.998	
Warranties and claims policies	2.849	
Production facilities and capacity	2.775	Considerable
Price	2.758	Importance
Technical capacity	2.545	
Financial position	2.514	
Procedural compliance	2.488	
Communication system	2.426	
Reputation and position in industry	2.412	
Desire for business	2.256	
Management and organization	2.216	
Operating controls	2.211	
Repair service	2.187	Average
Attitude	2.120	Importance
Impression	2.054	
Packaging ability	2.009	
Labor relations record	2.003	
Geographical location	1.872	
Amount of past business	1.597	
Training aids	1.537	
Reciprocal arrangements	0.610	Slight Importance

Exhibit 9.2.: Aggregate Factor Ratings in Supplier Selection Decisions (source: Dickson (1966)).

These four types are not mutually exclusive, since a product may give rise to more than one problem type.

Purchasing agents of major U.S. companies and British companies were asked to relate each of seventeen choice criteria to each of the four product/problem types. The major results of this study are summarized in Exhibit 9.3.

Routine Problem Products	Procedural Problem Products	Performance Problem Products	Political Problem Products
1.reliability of delivery	1. technical service	1. reliability of delivery	1. price
2.price	2. ease of use	2. flexibility	2. reputation
3. flexibility	3. training offered	3. technical service	3. reliability data
4. reputation	4. reliability of delivery	4. reliability data	4. reliability of delivery

Exhibit 9.3.: Difference in Choice Criteria for Different Industrial Products (adapted from Lehmann and O'Shaughnessy (1974)).

Based on their findings Lehmann and O'Shaugnessy ((1974), p. 41) conclude that the importance of choice criteria is significantly related to the type of product under consideration. Only reliability of delivery was mentioned in all four situations among the four most important criteria. This implies that supplier evaluation systems or supplier rating systems should be adapted to the product-type under consideration. Furthermore they observed some minor differences in results from USA-buyers and UK-buyers. British buyers appeared to be more service-oriented.

Inspired by Lehmann and O'Shaughnessy, White (1978) went one step further. He assumed that the criteria which are used to select suppliers, depend on two sets of variables i.e. product-specific variables and supplier-specific variables. These variables (17 in total) were related to six different product categories and four different buying situations. These four buying situations resembled the product categories as used by Lehmann and O'Shaughnessy.

The variables, that were investigated, were:

6 product-related variables:

- product reliability
- ease of maintenance
- ease of operation or use
- price
- technical specification
- training time required

Ten variables related to supplier characteristics, such as:

- confidence in the sales representative
- convenience of placing the order
- experience with the supplier in analogous situations
- financing terms
- overall reputation of the supplier
- reliability of delivery date promised
- sales service, expected after date of purchase
- supplier's flexibility in adjusting to the buying company's needs
- technical service offered
- training offered by the supplier

The remaining variable reflected the characteristics of the decisionmaker. This variable was designated as: preferences of the principal user.

Based on the research-findings, the following conclusions were made:

- The study shows substantial agreement among the purchasing managers as to which variables are most important in a Routine Order Situation. Reliability of delivery and ease of operation or use were consistently mentioned as primary factors in supplier selection across five out of the six product categories. With regard to the other three buying situations less agreement existed on what factors to consider.
- With regard to Component Parts there appeared to be a moderate consistency across the four buying situations. As important factors were identified: reliability of delivery, ease of operation or use and training offered.
- With regard to Raw Materials substantial agreement existed about what factors should be considered. Reliability of delivery, product reliability, technical specifications, technical service offered and overall supplier reputation were mentioned across three of the four buying situations.

- Process Materials appeared to have the lowest level of consistency across the four different buying situations, since none of the seventeen variables was rated important across all four situations. With regard to Accessory Equipment a similar conclusion was made.
- Major Equipment showed some consistency. Among the factors rated as important were: overall supplier reputation, ease of maintenance, technical service offered, ease of operation or use, technical specifications, product reliability and price.
- With regard to Operating Supplies only a moderate amount of consistency in importance ratings existed across the four situations. Product reliability, reliability of delivery and ease of operation or use were mentioned across three of the four buying situations.

From these results it can be concluded that price, which is often stressed in purchasing textbooks, appears to be only a secondary consideration in supplier selection decisions. Furthermore it can be concluded that no one group of variables dominates purchasing decisions in each product category.

However, the extreme view that every purchasing decision is unique and must be judged on its own merites is equally unjustified. Routine Buying Situations and Raw Materials and Major Equipment showed a substantial degree of consistency in the chore of important variables. For these categories perhaps some general guidelines for selection-decisions can be developed.
The research of White has important implications, when designing supplier evaluation systems. It is suggested here, that these systems should be adapted to reflect the characteristics of the purchased product category and/or reflect the type of buying situation.

9.3. Supplier Performance Evaluation Techniques

Formal supplier performance evaluation techniques generally serve the following purposes (Wieters (1977), p. 8):
- to support supplier selection decisions;
- to provide feedback to improve supplier performance;
- to improve control of critical purchased items;
- to provide purchasing information needed for internal planning and control;
- to provide information for negotiations with suppliers;
- to gain improvements in the handling of high volume items of suppliers;

- to evaluate buyers or to evaluate purchasing department performance.

A formal supplier evaluation system may, thus, help to identify supplier problems, which require immediate action and they may be used as a tool in supplier development programs.

Arriving at a sound classification of supplier-evaluation techniques is difficult due to the many terms which are used by the various authors. For our purpose we classify the various methods as follows

- Supplier Spread Sheets
- Subjective Methods
- Supplier-Rating Techniques
- Supplier Plant Surveys
- Supplier-Cost Approaches.

Each of these methods is discussed in more detail.

Supplier Spread Sheets (5)

In Supplier Spread Sheets all suppliers, who sent in their quotations, are listed on one axis, while the relevant selection criteria are listed on the other. Which factors are listed, depends on the specific product characteristics, the type of buying situation and the preferences of the individual buyer. Through a spread sheet differences between suppliers are apparent in one glance. This method is, due to its simplicity commonly used in supplier selection decisions (i.e. new task- and modified rebuy situations). A problem is that this method does not provide in a weighting of the selection criteria, so that ample discussion may arise among those involved, with regard to the qualification of a certain supplier.

Subjective Methods (6)

These methods draw on the experience and knowhow of the individual buyer and the purchasing department. They differ from the supplier spread sheet only in that they use the opinions of individual buyers as a measure to evaluate supplier performance. Next to the buyer, also other specialists may be involved in the evaluation procedure. However, as Sibley (1978) has demonstrated, evaluation criteria and the weightings assigned to these may vary widely, depending on the functional background of each specialist.

This method may be used for new suppliers as well as for existing ones. A comment on this method is, that due to its subjective character participants may influence each other's opinion. Further, when many suppliers are involved in

this procedure, evaluation may become a routine matter. For these reasons we feel that this method should be used selectively i.e. for new task buying situations and/or for the most important suppliers.

Supplier Rating Techniques (7)

In general these methods are most frequently used by companies. In most cases they consist of a limited number of criteria to which different weights are assigned. In this way a composite supplier performance index can be calculated. Suppliers, then, are compared with regard to their overall score. This method can in most general terms be stated as follows:

$$P_i = \sum_{i=1}^{n} (R_{ij} \times I_j)$$

where:

P_i = Preference for Supplier i

R_{ij} = Rating for Supplier i on Criterion j

I_j = Importance of Criterion j for the decision situation

and n = number of relevant criteria.

Seeming objective at first sight, this method to a large extent has subjective elements:

- the decision on what criteria to include in the evaluation process is still a subjective one;
- the weightings for the various criteria are established in a judgmental way.

A difference with the Subjective Methods is that all criteria are stated in quantitative terms and relate to past performance. Therefore, this method can be used only for existing products and/or suppliers (i.e. Routine Buying Situations). Some additional observations on this method are, finally:

- an advantage of this method is that it provides a rationale for supplier performance evaluation i.e. it is equally applied to all suppliers;
- applying this method to a large number of suppliers requires a lot of work: in this respect a fair degree of computerization of the purchasing administrative system will be needed in order to work efficiently.

Supplier Plant Surveys (8)

When the suppliers' list has been narrowed down to just a few potential suppliers, the adequacy of the supplier's manufacturing facilities and technical knowhow should be further investigated. This investigation requires a visit by the buyer (9). Depending on the importance of the visit, the company may send

representatives from only purchasing and engineering; or it may also include some combination of representation from finance, production and quality control. In evaluating potential sources in this way, the four most common areas of evaluation are technical knowhow and experience, manufacturing strengths, financial strengths and management capability.

Technical know how and experience

In this part it should be assessed to what extent the supplier has contributed to improving the customers' endproduct. Furthermore, it should be assessed to what extent he will be able to contribute in this respect in the near future. These improvements may stem from lower prices for purchased materials as offered by the supplier. But these may also be the result from more efficient transportation and stocking-procedures.
Thirdly insight should be gained in the degree of quality improvement, which has been realized by the suppliers products. What technological developments were introduced in terms of new products and/or process-engineering at the supplier's plant? How do these developments compare with those of the major competitors of the suppliers? A supplier plant survey should answer these questions. Due to its technical nature this survey should not be conducted solely by the buyer; a team approach is necessary in which various disciplines participate.

Manufacturing capabilities

This issue relates to investigating the condition of the manufacturing facilities, as used by the supplier. Does the supplier work with old equipment or does he work according to the latest methods? What investments have been made or are planned in the near future? To what extent will these affect product costs and quality? These questions should be raised in order to get an insight in the efficiency of the supplier's manufacturing operation.

Financial Strengths

This aspect poses important problems to the buyer nowadays, due to the increasing number of bankruptcies in the Western world. A thorough financial assessment of the major suppliers should be regularly made, since financial structures can change rapidly over time. Aspects which should be covered in such an assessment include liquidity, solvency, profitability, loancapacity, etc.
Recent developments in financial analysis provide instruments, which can be used to forecast company failures, and which therefore are of great interest for the purchasing manager (10). It is our opinion that the purchasing practice (and

literature) is largely behind in that it does not reflect the use of these methods. However, it is clear that an analysis of the financial strength of the supplier should be an important part in any formal evaluation and that the buyer should have a basic understanding of the techniques, that are being used in that respect (11).

Management Capabilities

This may be the most important area in supplier assessment, since the quality of management to a large extent determines supplier performance. The buyer needs to keep informed about the changes going on in the supplier's management. Experiences with purchasing managers have shown that these changes sometimes are the prime factor for considering other supplier. Research has shown that personal relations in industry are very important in risk-reduction, when buying production materials (see Hakansson (1982)). However, getting this information requires some effort: personal visits need to be made, annual reports analysed, and the Chamber's of Commerce Register should be consulted.

The method, as has been described here, is a rather fundamental one. The many facets, which are involved, require that many disciplines participate in the assessment. In this way a more realistic picture of the supplier will emerge. Considering the rather intensive character of this method, selective application is recommended for the following situations:

- It should be primarily applied for suppliers of strategic materials and services i.e. items, which due to their volume or supply, are of vital importance to the company.
- There should be a (potential) longlasting relationship between supplier and customer (e.g. purchasing capital equipment and customer specified production components).
- There should be a good relationship and cooperation between purchasing and the other functional departments (such as production requirements planning, quality control and incoming inspection, production, product engineering, etc.) in order to arrive at a balanced assessment.

Supplier Cost Approaches (12)

These methods are only suggested by a limited number of textbooks. Kudrna (1972) provides the most thorough and most detailed discussion: in fact his whole book is devoted to this subject. Those methods are in fact more fundamental extensions of the supplier rating techniques. All criteria, to be considered

in evaluating supplier performance (such as service, price, quality and delivery - reliability) are quantified and expressed in terms of costs. The reasoning behind this is that bad supplier performance always leads to higher purchasing costs:

- payment-terms and mode of transportation may affect the price to be paid;
- rejected orders lead to extra administrative costs, handling costs or, if the order is not returned to the supplier, costs of rework and repair, sorting out and scrap;
- long delivery times affect inventories and production flexibility; unreliable deliveries may require higher safety stocks and more expediting effort.

On the other hand past (or future) cost improvements, as have been suggested by the supplier, should be recognized when evaluating a supplier. The essence of the method is that it relates all identifiable purchasing costs to the value of shipments received from respective suppliers.

In doing this, total materials costs should be considered: e.g. the extra costs of surplus inventory in case of unreliable delivery-performance are recognized in this method. A problem in identifying the cost-elements is that usually only three (price, freight and promise) are readily visible to the buyer. The costs of the other elements are often hidden in the firm's cost of money, the supplier's past and expected future performance and the company's contractual responsibility. Making these elements visible requires a large amount of data, which may take some effort to collect. Many data need to be collected from other departments, which may be laborious and troublesome. These in fact may be the main reasons why this method is hardly being used. To these reasons may be added the lack of knowledge of most buyers of financial calculation techniques. However, it has been Kudrna's prime merit, that he provides a detailed and consistent approach, which can be used for existing as well as for potential suppliers.

As has been discussed before, quality, price, delivery and service are important factors in evaluating supplier performance. Generally also some additional factors are considered before a contract with a supplier is renewed and/or a new supplier is awarded with a purchasing order. Examples of these additional factors are:

. annual purchasing expenditures per supplier: are these growing or declining over the years;

. annual purchasing expenditures by geographic area; this is to identify to what extent purchases are made locally versus those that are made internationally;
. annual purchasing expenditures with other plants or divisions belonging to the same company; sometimes international sources of supply may for political reasons be preferred over more economic external sources;
. percentage of purchasing expenditures as made through sole sources;
. percentage of purchasing expenditures as derived from reciprocal agreements; reciprocity refers to the practice of giving preference to suppliers, who are also customers of the buying company;
. percentage of purchasing expenditures as accounted for by new suppliers; new suppliers are defined as those, which have been selected in a specific year for the first time; some authors (see Miller (1978)) hold that 5% to 10% of the purchasing turnover should be made annually through new suppliers.

Although other additional measures may be mentioned (such as the percentage of purchases made through distributors versus manufacturers), this list presents some ideas on what other factors may be considered in source selection. It may be observed that these factors are more of a political nature and are used to allocate purchasing activities.

9.4. Benefits and limitations

Based on our description of supplier evaluation techniques we may conclude that these techniques have advantages as well as limitations. As advantages may be mentioned (Van Weele (1983)):

- although partial, these techniques provide some objectivated indication of how the supplier performed;
- a systematic, formal evaluation procedure may lead to justified higher requirements from suppliers;
- such an evaluation may identify limitations and weaknesses of the own organization;
- such an evaluation may identify weaknesses in specification requirements which may lead to corrective action;
- a systematic, formal evaluation may contribute to an unbiased relationship with suppliers, since problems are identified and hard facts are provided;
- a systematic, formal evaluation system may contribute to the development of a supplier; if a supplier is informed that he is regularly evaluated, he probably pays more attention to the needs and requirements of his customers.

However, depending on their structure, supplier evaluation techniques also have limitations.

- Most techniques insufficiently recognize the qualitative aspects of supplier performance. As has been demonstrated by research, reputation, flexibility and financial strength tell more about a certain supplier than price and delivery performance. However, these factors are seldomly recognized in formal evaluation and -rating systems.
- In spite of all systems, that have been developed over time, it is our conclusion that supplier evaluation ultimately is a highly subjective process, which may differ from person to person or, when a multiplant company is involved, may differ from purchasing department to purchasing department.
- Interpretation: most systems do not indicate underlying reasons for a certain performance. These should be known by the buyer in order to be able to take corrective action or to propose measures for improvement to the supplier.
- Determining what standards for evaluation to use is a definite problem. Suppliers of different products can often hardly be compared; a common standard for all suppliers is hardly feasible. Similarly, companies will put different demands depending on if they are dealing with large or small suppliers.

The most important drawback of most supplier evaluation systems to our opinion is, that most of them are "after-the-fact", since they are primarily based on historical data. A purchasing manager is not primarily interested in how a certain supplier performed in the past. However, he wants to know to what extent that supplier will be able to live up to the requirements of the company in the near future.

To our opinion the ultimate selection of a supplier evaluation method will depend on three crucial questions i.e.:

1. for <u>what purpose</u> is the method going to be used; in this respect three major alternatives are:
   - for supplier selection decisions;
   - for control and/or improving supplier performance;
   - for preparing supplier negotiations;

2. <u>what type of buying situation</u> is involved; as has been discussed in Chapter Two possibilities in this respect are:
   - New Task Buying Situation

- Modified Rebuy Situation
- Straight Rebuy or Routine-Buy Situation

3. what is the strategic importance of the product being considered:
   - strategic purchased product
   - non strategic product.

Depending on the answers to each of these questions, the degree of detail of the required information will differ and, therefore, will determine what supplier evaluation method is most appropriate. Exhibit 9.4. reflects this thought. As can be seen from this Exhibit:

- Supplier Plant Surveys are suggested for new task buying situations and modified rebuy situations, when buying strategic products

- Supplier Rating is suggested for control purposes and when dealing with Routine buying situations;

- Subjective Methods are advised primarily for Supplier selection purposes, when dealing with strategic products (due to its time consuming character); it is important that specialists of various departments are able to participate;

- Supplier Spread Sheets can be used when dealing with non-strategic purchasing items for purposes of supplier selection and/or preparing negotiations;

- Supplier Cost Approaches are suggested for all purposes when buying strategic products.

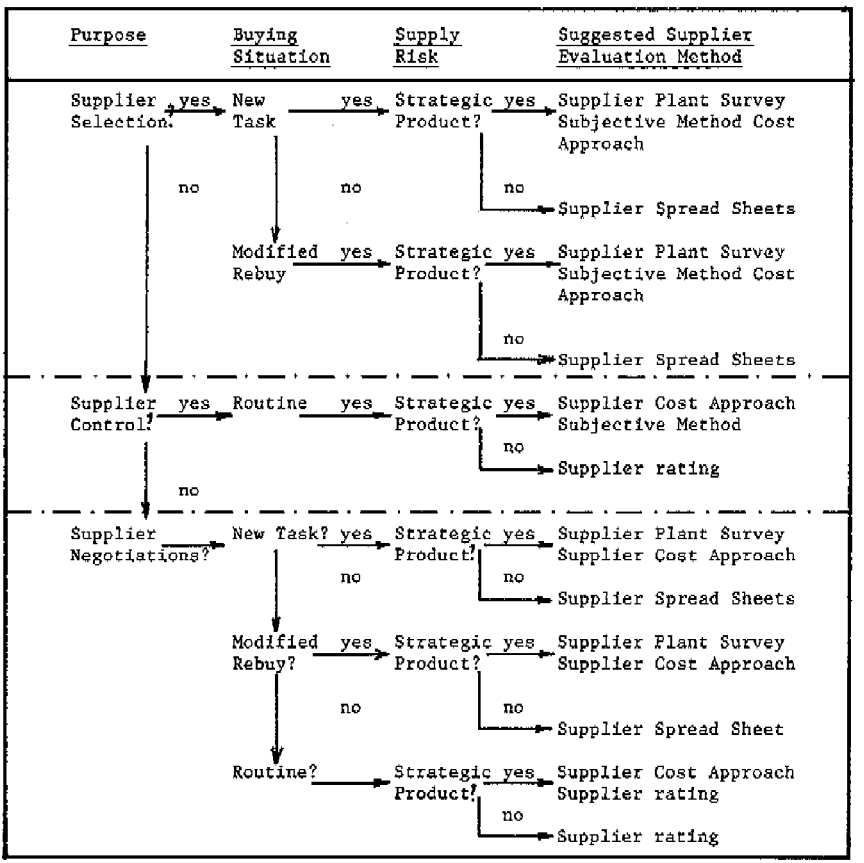

Exhibit 9.4.: Selecting a Supplier Evaluation Method.

9.5 Future developments

At the end of this Chapter we like to describe the implications of the increasing use of computer technology in the purchasing area for supplier performance evaluation. Secondly, we would like to describe the implications of new philosophies regarding materials requirements planning for purchasing performance evaluation.

Computer technology has considerably expanded the possibilities to provide buyers with up-to-date information of their suppliers. Especially when supplier information is made available through on-line information systems, this may be a great tool for the buyer in sourcing decisions. Such systems, which are currently being used in some large multinational companies in the USA and Europe (13), however, require a high degree of integration between purchasing and the materials management area: data on orders delivered (such as promise date, required date, delivery date, quantity ordered, quantity delivered, etc.) should be immediately fed into the system by the Incoming Shipments-area. For purchasing purposes the information system should be structured in such a way, that a historical survey of a specific supplier is made with regard to his delivery performance. This integration should also be realized for the Quality Control Area. Data on rejects, number of orders delivered, quality problems, hours of rework and repair should be presented in such a way that a Quality Profile Chart per supplier results. These Quality Profile Charts may immediately show the number of quality failures, the severity of these problems (indicating what improvements are needed) and the extra costs incurred. These Charts then may be compared with those of other suppliers within the same product group in order to identify extraordinary variances in performance. In this way the information system could not only be used for supplier selection but also for improving the relationship with a specific supplier. It may facilitate and reinforce the negotiation power of the buyer, since he has the evidence of hard data.

Similar ideas could be developed for price performance evaluation. If price information is available through an integrated system, suppliers within a specific product group can be directly compared on their prices (provided that these prices have the same base). Variations in price among several suppliers could be immediately identified.

If more purchasing locations are linked to such a system, the benefits may be even greater. In the multinational companies, where these systems have been introduced, this has led to better coordination of decentralized purchasing operations and as a result to substantial savings.

These ideas may sound unrealistic and in the many interviews, which were conducted for our study, we did not encounter a picture as complete as described here. It is our opinion, however, that computerization in the purchasing area provides many opportunities and challenges. The trend towards further decentralization in the use of computer technology and the improved possibilities to link intermediate computer systems improve the possibilities to use the comput-

as a tool for daily decision making. However, these systems take a long time to develop. Success will depend on many factors. The most important of these are:

- the extent to which purchasing practitioners are able to define their information needs;
- the creativeness of purchasing practitioners for using the computer for their purposes;
- the state of the art of computerization within the materials management area (production planning, incoming inspection, quality control, inventory control).

Besides computerization, new philosophies on materials requirements planning will affect the way in which supplier-performance is measured and evaluated. These philosophies, which are often designated as Just-In-Time Production, KANBAN and Manufacturing Resources Planning, are aimed at improving productivity in the materials area. An important element in these philosophies of new systems is reduction of inventories, whilst preserving or improving production-flexibility. The implementation of these systems will definitely put greater demands on suppliers in terms of quality-assurance and service-reliability. Under these systems efficient production is possible only when "zero- defects" and prompt delivery are guaranteed. Quality failures and delivery problems are no longer allowed, since each will directly affect production leadtimes.
Instead of being evaluated afterwards, suppliers will be evaluated more and more in advance. Before granting business to a certain supplier, he will be thoroughly screened in advance on service, financial stability, reputation technological developments and quality assurance. Screening suppliers on these aspects, beyond doubt, requires a multidisciplinary approach. As a consequence it can be expected that supplier performance measurement and evaluation will more and more become what it is: a shared responsibility between purchasing and the other material related functions.

9.6. Conclusions

From our literature survey it may be concluded, that the subject of supplier performance evaluation is discussed by most authors in a rather discriptive way. Ideas, that have been developed in theories on organizational buying behavior, are not reflected when discussing the subject. Furthermore, few original ideas have been found.

Concluding, the following observations can be made.

- The criteria used when evaluating supplier performance in general depend on:
  - the purpose for which it is intended
  - the product characteristics
  - the buying situation
  - the characteristics of the individual decision-maker.

  As a consequence, general guidelines are difficult to develop; criteria need to be tailored to each specific buying situation. There is some evidence that supplier delivery reliability and customer service are important criteria. Price seems less important than suggested.

- Research on supplier performance evaluation has been too limited in scope and too general in nature. Most research has been limited to purchasing practitioners (who in some instances may only play a minor role in supplier selection), whereas it did not recognize the four factors mentioned above. It therefore, has contributed little to the solution of practical problems in this area.

- Most supplier evaluation systems are historical in perspective. Therefore, they only can be used to control and improve the performance of existing suppliers.

- Most systems do not provide a perspective on the supplier's ability to meet the company's future needs and requirements, which is what each buyer is interested in.

- Supplier performance evaluation faces problems, which are similar to those associated with purchasing performance evaluation. Its ultimate measure lies not in whether it is accurate enough, but whether it is good enough for its intended purpose.

- Literature lags way behind industrial practice since modern financial techniques and the consequences of computerization and computer-technology are not discussed.

Notes to Chapter Nine

1. See Collins, Van Dierdonck and Vollmann (1981).
2. See for a detailed discussion on how suppliers may influence innovation-processes in industry Von Hippel (1978) (1982).
3. See our report on "Developments in Purchasing Management in the United States" (Faes, De Rijcke and Van Weele (1982)).
4. In purchasing literature the terms "supplier" and "vendor" are used interchangebly: we will use the former term during our explanations.
5. Spread Sheets are also referred to in literature as Matrix Analysis and Suppliers Lists (see Lee and Dobler (1971) and Hill (1973)).
6. This method is discussed in literature under Vendor Rating Forms and Categorical Plan Methods (see Heinritz and Farrell (1971), Hill (1973), Bailey (1978) and Zenz (1981)).
7. These methods are often designated as Vendor Rating Systems and Weighted Points Plans: they are discussed in most purchasing textbooks.
8. This section has been largely based upon Van Weele and Lagerweij (1982).
9. The word "buyer" is used here in its broadest sense, meaning the buying company.
10. See Altman (1974), Bilderbeek (1978) and Ooghe (1982) for a detailed discussion of this subject.
11. See for a detailed discussion of this subject, written especially for the purchasing practitioner Guide to Purchasing (1976) and Soenen (1982).
12. This method is also referred to as Total Cost Approach (Kudrna (1972)), or Cost Ratio Plan (Hill (1973)), (Zenz (1982)).
13. See (Hilberts (1983)).

CHAPTER TEN: GENERAL REFLECTION AND CONCLUSIONS

10.1. Introduction

As we have stated in Chapter One, the subject of this study had been discussed from a managerial and rather instrumental point-of-view. However, the measures and techniques which have been presented in this study will show no results or improvements, if they are not properly applied and integrated in the organization. Their effectiveness depends to a large extent on how they are perceived by the buyers. The techniques should be consistent with their needs and interests. We see purchasing performance measurement and evaluation as an important means of increasing the buyer's motivation and hence, of increasing his performance. For this reason we would like to conclude our study with a discussion of the behavioralistic implications of purchasing performance measurement and evaluation. In doing this we will closely adhere to the ideas expressed by Argyris and Schön (1978) and more recently by Peters and Waterman (1982).
The ideas of these authors are described first in this Chapter. Further, we present an overview of the most important conclusions of our study. Finally, some recommendations are made for future research.

10.2. Purchasing Performance Measurement and Evaluation: A Learning Perspective

At one of the companies which we visited there had been a vacancy for a purchasing manager. Management was looking for a young, ambitious man. The person, who was going to apply for the job was required to accept the following commitment: he should be able to reduce purchasing costs with 5% within three years. Our spokesman accepted the commitment and accordingly was given the job. When asked, if he did not feel himself uncomfortable at being given this target, he said: "Not at all, since they still have to decide how they are going to measure my performance."

This case illustrates that purchasing performance measurement and evaluation is a difficult issue. Implicit in the answer of our spokesman is that he feels confident of providing information that he has reached his target.

In another company we visited the purchasing department had more than met its target to reduce materials costs by a certain amount. However, at the end of the year only those projects that exactly met the overall target were reported. The remaining projects were held in reserve, since the purchasing manager had learned from experience that management would come back next year with higher demands. As this purchasing manager said, exceeding the target, appeared in the past to be followed by even higher requirements from management the following year.
As a consequence the purchasing manager started to hold back some projects that could in fact have been realized in reserve for the next year. In this way he had already realized part of the following year's target and he could concentrate all his efforts on realizing the rest of it. This approach, therefore, led him in certain situations, to postpone the full accomplishment of certain projects until the next year.

Both cases are examples of what Argyris and Schön (1978) have described as "single loop learning". Single loop learning occurs when members of the organization respond to changes in the internal and external environments of the organization by detecting errors, which they then correct so as to maintain the central features of the organizational theory-in-use (i.e. the objectives as pursued by the organization). (Argyris and Schön (1978), p. 18). What happened in both cases was that both purchasing managers would achieve their targets. These targets (as established by management) were not questioned. Data on results would be manipulated as to satisfy management demands, regardless of what was best for the organization.

As we see it, both situations are counter-productive to the overall company's performance. Especially in the second case mechanisms were present which prevented executives from honestly reporting their actual results to higher management.

Argyris and Schön report similar cases, where executives had experienced that questioning targets, as established by higher management, was a delicate matter. As a consequence they tried to work round these rather than confront them.

These problems are in our opinion also apparent in the purchasing field. A major difficulty is that a direct relationship between purchasing resources and purchasing results often does not exist. When the purchasing function is measured

only in terms of cost measures (such as cost/turnover measure) buyers will lose confidence. For this reason we have taken the viewpoint for our discussion that purchasing performance measurement and evaluation should help the individual buyer to support and improve his daily decisionmaking, and should not be used to punish or reward buyers (1).

As Argyris and Schön argue, organizations cannot exist only with single loop learning processes. Single loop learning is sufficient where error correction can proceed by changing organizational strategies and assumptions within a constant framework of norms for performance. It is concerned primarily with how best to achieve existing goals and objectives and how best to keep organizational performance within the range specified by existing norms. In some cases, however, error correction requires an organizational learning cycle in which organizational norms themselves are modified. This kind of learning is designated by these authors as double-loop learning. Double loop-learning involves a double feedback loop, which connects the detection of error not only to strategies and assumptions for effective performance, but to the very norms which define effective performance (p 22). This kind of learning involves not only raising or lowering the organizational norms, but also a process of constantly examining their validity, by which groups of managers confront and resolve their conflicts.

As a consequence Argyris and Schön developed a somewhat different view on organizational effectiveness. As they note:

- the achievement of stable solutions is not an appropriate criterion for organizational learning; it is in the very nature of organizational problem solving to change situations in ways that create new problems;
- organizational effectiveness - as measured by the achievement of espoused purposes and norms - is an incomplete criterion for organizational learning. It is appropriate in situations where error correction can occur through single-loop learning alone. It is insufficient in situations, where inconsistencies in organizational theory-in-use (i.e. objectives) set requirements for double-loop learning.

When we argued that purchasing performance measurement and evaluation should contribute to higher buyer-motivation, we had in mind that this could only be realized in an "open" managerial climate. In such a climate buyers should participate in determining their targets and in deciding on the instruments that

will be used to monitor their performance. However, such a climate is difficult to realize since it can not be considered separate from such issues as:

- the overall goals and objectives of the organization;
- the culture, values and norms which underly the managerial style within the organization;
- the managerial style itself;
- the punish- and reward systems, as present within the organization.

Clearly, the purchasing control system cannot be considered separately from the control systems that pervade other areas of the organization.

10.3. "Ready.Fire.Aim. Learn from your tries" (2)

As has been indicated in this study, measuring and evaluating purchasing performance creates many problems in terms of accuracy, reliability and validity (see Chapter Three). In our explanation we adhered to the ideas of Anthony and Dearden (1976) and Mason and Swanson (1981), who state that performance measures should not be assessed on whether they are accurate or not; rather, they should be assessed on whether they can be used for their intended purpose or not.
When developing a performance measurement and evaluation system in purchasing, a practical approach is recommended. Purchasing management should be willing and prepared just to experiment in this area. Taking action, how unprepared it may be in a first stage, is still preferred over doing nothing. After some time problems and limitations may show up, which can be improved in a second stage. This is what we actualy perceived, when we visited some companies, after having conducted our field research. For example, those companies working with cost-reduction programs (see Chapter Six) in many cases appeared to have reformulated their definitions of cost-savings and refined their operating procedures in this area. Purchasing performance measurement and evaluation is a continuous process of organizational learning. Further, we recommend that measurements should be kept as simple as possible. This is especially important in an initial stage. Everyone concerned should be able to understand what is being measured and evaluated and understand for what reason this is being done.

When developing purchasing performance measurement and evaluation systems, companies may go through several stages:

1. Registration. At this stage statistical data on purchasing prices, transactions, orders, deliveries etc. are collected in a systematic way and on a

daily basis; the major issue at this stage for the purchasing manager is to keep track of what is going on in his department.

2. Analysis. At this stage, purchasing managers will look for relationships between means and ends. Historical records permit time-series analysis. One gets a feel for what data are exceptional and out of line and what data could have been expected. Also at this stage the purchasing manager is going to differentiate between purchasing effectiveness on the one hand and purchasing efficiency on the other. Various measures are developed and implemented. A real danger at this stage is that these may become too complex and numerous. Care should be taken that buyers do not lose touch with them.

3. Budgetting and forecasting. When records are accurately kept up to date and when relationships between parameters have been established, this knowledge may be used to establish future-oriented or planned standards of performance. At this stage measures may be further defined. For example, price-standards of purchased materials may be divided into standards related to the materials content, labor content and overhead.

These stages are only suggestive of ways in which companies may go through several stages of development. The stage of development clearly will reflect the degree of sophistication of the measures and techniques that are being used to monitor purchasing performance.

When measurement and evaluation systems are to result in better performance and motivation, several conditions should be met. Bobbe and Schaffer (1982) mention the following:

- create a competitive climate in the company, which entails determining clear targets in a participative manner and choosing only a few ways in which the achievement of the target is measured;
- plan, organize and monitor the selected measures in a careful way: delegate authority where possible and provide staff support;
- be realistic and focus efforts on those projects that can be realized in the short term, since this will lead to increased motivation.

In this way we have put the subject of purchasing performance measurement and evaluation into a somewhat broader perspective. At the end of our study we turn to the major conclusions and recommendations for further research.

10.4. Major conclusions

In this paragraph the major conclusions of our study are summarized. They are related to the chapter from which they have been derived.

Chapter Two: The Purchasing Management Process

2.1 Purchasing control should be an integral part of the purchasing management process. It should not be considered separate from it.

2.2 The characteristics of the buying situation influence the way purchasing performance is measured and evaluated.

2.3 Purchasing processes may relate to different types of products. Accordingly, performance measurement and evaluation techniques should be adapted to various market-conditions and product characteristics.

Chapter Three: Management Control Theory: A State of the Art

3.1 Control in organizations cannot be considered separately from planning. Planning provides the organization with tasks and objectives, which in essence are the standards against which human activities are evaluated. Without effective planning there can be no effective control.

3.2 In evaluating organizational activities a distinction should be made between effectiveness and efficiency. Organizational performance may be improved through increased effectiveness, efficiency or both.

3.3 Performance evaluation is not an objective in itself. It should be used to contribute to better organizational decision making.

3.4 When measuring organizational performance, the question is not whether a given measure is accurate or not, but whether it is good enough for its intended purpose.

3.5 Quantitative measures can be used to support, not to supplant judgment. They provide individually only a partial view on how the organization performs.

3.6 Performance measures have important implications for human behavior. When people are measured and evaluated on the basis of certain criteria they want to score as high as possible, regardless of what is best for the organization.

Chapter Four: Purchasing Performance Measurement and Evaluation: A Literature Review

4.1 There is no universal way or method of evaluating purchasing performance. Due to variations that exist among companies and due to the many intangible factors affecting purchasing performance, methods and techniques need to be adapted to various circumstances.

4.2 Purchasing performance cannot be expressed in a single index. If quantification is preferred, several indexes are required in order to obtain a useful insight.

4.3 Although purchasing effectiveness and efficiency are sometimes discussed in the literature, no clear definition of these concepts was found.

4.4 A conceptual framework underlying the subject of purchasing performance is lacking.

4.5 The suggestion that purchasing performance should be monitored against previously established goals and objectives, is based on the assumption that purchasing performance can actually be translated into norms, which can be measured. This assumption, however, is open to discussion.

4.6 Some authors suggest that purchasing performance should be measured in terms of end-products costs. This view, however, is too narrow since purchasing's contribution towards the company's long term profit and growth is never considered.

Chapter Five: Methods for Evaluating Purchasing Performance

5.1 In literature several ratios and measures are described that can be used to assess purchasing activities. This is done usually in a rather general way. This is a major problem, since most of the measures and techniques can only be applied in very specific situations.

5.2 The literature on purchasing performance evaluation reflects only to a limited extent concepts, which have been developed in management control theory. In particular little attention is given to such matters as the place of purchasing performance evaluation in the purchasing management process, its implications for human behavior and prerequisites for effective control.

5.3 The approach towards purchasing performance evaluation as described in the literature, is rather mechanistic and instrumental. Implications for human behavior are seldom described.

5.4 Most techniques as described are after-the-fact, i.e. they relate to historical events and/or activities performed in the past. This is unfortunate since purchasing managers are primarily future-oriented.

5.5 Most assessments on purchasing measures and evaluation techniques concern their validity, accuracy and reliability. However, they should be assessed primarily in terms of their practical value.

Chapter Six: Purchasing Performance Measurement and Evaluation: An Empirical Survey Among Dutch Companies

6.1 In our research five groups of performance measures have been identified. When measuring purchasing performance Cost Related Measures appear to be used most (71%) by the companies. These measures were followed, in terms of frequency by Department Related Measures (56%), Buyer Related Measures (40%), Quality Related Measures (28%) and Delivery Related Measures (26%).

6.2 Purchasing performance evaluation appeared to be somewhat more formalized at larger companies compared with smaller companies.

6.3 Evaluating purchasing departmental performance and buyer performance is mostly carried out on the basis of qualitative criteria.

6.4 Evaluating the quality of incoming materials is based upon a limited number of criteria. It appeared that the consequences of defective quality are seldom stated in quantitative terms.

6.5 Supplier delivery reliability is seldom critical due to many preventive measures being taken by companies. This may explain the rather low figure for delivery related measures (26%).

6.6 Structural variables such as company size, production process technology, purchasing departmental size, purchasing turnover ratio and purchasing reporting relationships are not significantly related to the application of certain purchasing performance measures. Behavioral variables, such as management style and the responsibilities assigned to the purchasing function, seem to be better predictors of the use of performance measures in purchasing.

6.7 The degree of sophistication in measuring purchasing performance seems to relate to the extent to which the computer has been introduced in purchasing.

Chapter Seven: Operational Control in Purchasing: A Conceptual Approach

7.1 The set of tasks and responsibilities assigned to the purchasing departments affect the character of the measures and techniques which are used to evaluate its performance.

7.2 Purchasing performance evaluation should include four important areas namely costs and prices of purchased materials, the quality of incoming materials, purchasing logistics and purchasing organization.

7.3 Evaluating the quality of incoming materials includes purchasing's predesign involvement as well as post-design involvement.

7.4 Evaluating purchasing logistics includes assessing the timeliness of the requisitioning, and supplier performance.

7.5 Evaluating the purchasing organization includes evaluating purchasing personnel, purchasing management, purchasing procedures and guidelines, purchasing systems and purchasing research.

7.6 If purchasing performance measurement and evaluation is to serve the purpose of self-appraisal, the buyer needs to participate in the establishment of standards for his activities.

7.7 Standards for evaluation can be set only for those areas, for which the buyer can be held responsible. It is recognized that a buyer usually has limited freedom, since he is restricted in many respects by market-conditions and the internal company environment.

7.8 Since the scope of the purchasing function differs among companies, standards and norms for evaluation cannot be easily derived from other purchasing organizations.

7.9 Purchasing performance is a shared responsibility. Since many departments are involved in buying decisions and only a limited responsibility is attributed to the purchasing department, purchasing performance cannot be ascribed to the purchasing department alone.

7.10 Purchasing control has been defined as the process of ensuring that specific tasks are carried out effectively and efficiently. It encompasses purchasing performance measurement and evaluation.

Chapter Eight: Operational Control in Purchasing. Some Ideas

8.1 Targets for the reduction of costs and prices of purchased materials should reflect only those elements that can be influenced by the individual buyer. More specifically they should be corrected for inflation and changes in exchange-values of foreign currencies.

8.2 Standards for the evaluation of purchasing prices should be primarily based on the method of price-setting. Depending on the characteristics of the supply-market, they can be based upon market-factors, cost-factors or both.

8.3 Evaluating the quality of purchased materials requires an evaluation of purchasing's involvement in the post-design as well as in the pre-design stage. The latter, however, is difficult to evaluate in an objective way.

8.4 In evaluating purchasing departmental performance a distinction should be made between evaluating departmental effectiveness on the one hand and departmental efficiency on the other.

8.5 The purchasing product port-folio, as developed by Kraljic (1981) is a proper tool for determining what techniques for purchasing performance measurement and evaluation should be used in a certain situation.

Chapter Nine: Supplier Performance Evaluation Techniques

9.1 Most supplier performance evaluation techniques are historical in perspective. They do not provide a perspective on the supplier's ability to meet the company's future needs and requirements.

9.2 Research conducted on supplier performance evaluation is too general in nature. Therefore, it has contributed little to the solution of practical problems in this area.

9.3 Supplier performance evaluation systems do not reflect the specific product-characteristics, buying situation and strategic importance of products.

9.4 The literature does not reflect the influence of computerization on supplier performance evaluation.

10.5 Future Research

We are aware that we have only made a modest contribution towards the conceptualization of purchasing performance measurement and evaluation. In order to have relevance for the purchasing practitioner many ideas need to be tested in a practical setting. To stimulate research in this area, we suggest the following guidelines for future research:

1. Present theory on purchasing performance measurement and evaluation reflects only to a limited extent new developments in computer technology and

-application. The fact that the computer is introduced in purchasing nowadays presents many opportunities for performance monitoring. Future research should focus on the implications of computer application for performance measurement and evaluation.

2. A crucial question, which is not covered by our study, is to what extent systematic performance evaluation contributes to professionalism in purchasing. Are companies with advanced measurement systems performing better than companies which do not employ these systems?

3. Comparative research in purchasing is significantly hampered by two problems. First, companies appear to differ to a large extent in their degree of centralization. Secondly, purchasing departments tend to differ in the scope of the tasks and responsibilities that are formally assigned to them. Future research should focus on developing a methodology, that deals with these problems.

4. Performance measurement and evaluation can be used to motivate buyers in order to improve purchasing operations. Future research should focus on identifying other means that can be used to increase buyer motivation.

When conducting future research in purchasing and more particularly in the area of purchasing control, we think much is to be gained from insights which have recently been developed in the literature on management control and organizational learning. In this respect the literature on organizational buying behavior can also be mentioned as a source of valuable information to researchers.

Notes to Chapter Ten

1. This is open to discussion; at some companies purchasing performance is measured primarily for this purpose.

2. See Peters and Waterman (1982), p. 155.

Epiloque

At the end of this study we would like to reflect on our initial objectives and premises. It appeared that purchasing performance measurement and evaluation is a far from simple matter. Its complexity can partially be ascribed to the apparent lack of definitions and conceptualization in this field. Purchasing literature is rather superficial and in original in this respect. A systematic approach towards purchasing performance measurement and evaluation was not present in the literature. This was the initial starting point for this study and it is hoped that we have succeeded in providing a consistent and comprehensive view on this topic.

Purchasing performance evaluation should not be considered as isolated from the management process; in fact, it is an integral part of it. Evaluating purchasing activities starts with a determination of norms and standards. Without these, evaluation is not feasible. It is disappointing to see that these norms and standards, however, are often not present in industrial companies.

Our approach towards purchasing performance measurement and evaluation can be considered as a conceptual model. This model is based upon the assumption that managers behave in a rational way. As Botter (1981) states:

"Rational behavior requires that the complex reality is replaced with a model that is simple enough to work with. The choice of what parts, items or elements and relations should be included in this model and what not, depends on the objectives of the researcher".

Our objective has been to present a model which can be used by the purchasing practitioner to monitor and evaluate purchasing performance and which is consistent with recent management literature. Of course this model should be used together with other models. To cite Botter again on this issue:

"Research in organizational decisionmaking has shown that decision-makers simultaneously use various models from various disciplines. If one model does not provide the solution, decision-makers tend to switch to other models, until they have found a satisfactory solution to their problems".

In deciding what measures and techniques to use, the purchasing manager should be very selective. It requires continuous balancing of costs versus revenues and benefits. An important consideration is to start in a simple way. Systematic and comprehensive evaluation systems can only be introduced gradually. The purchasing organization should have the opportunity to learn from its successes and to improve possible weaknesses. Unplanned introduction or change will meet resistance.

It is the human factor and the organizational climate, which ultimately determine whether a given system or procedure will work or not. It is our conviction that purchasing performance measurement and evaluation should not be used primarily to punish or reward people; rather it should help the buyer and the purchasing manager to make things visible, to show them where they are and the direction they should follow. One of the most important aspects of these systems is that they can contribute to higher buyer motivation and prevent people from standing still. It can perhaps be compared with speedskating, where the pupil continuously is encouraged by his coach who gives him the time for every round. Would his pupil perform better, if he did not know whether he was on schedule or not? We think not.

APPENDICES

Appendix 1

Historic overview of literature on purchasing performance measurement

Author and Publication	Aim of Evaluation	Suggested Techniques
John C. Dinsmore (1982) Purchasing Principles and Cases	Control of departmental costs	Operating Purchasing Budget
M.B. Twijford (1924) Purchasing, its economic aspects and proper methods	Improved purchasing operations	Appropriate forms, and procedures
W. Mitchell (1927) Purchasing	Better control of purchasing operations	Monthly summary report-comparing actual estimates
E. Gushee & L.F. Boffey (1928) Scientific Purchasing	Reduction of costs and improved costs control	Monthly records and performance ratio's
W.H. Carney (1931) (paper)	Objective measurement of purchasing performance	Statistical records, performance ratio's
V.M. Jones (19319 "Seven points that measure a Purchasing Departments Efficiency" (paper)	Quantification of purchasing's costs	Cost records on ven-performance, budget, overall performance index
D.G. Clark (1931) "The Balance Sheet of Departmental Efficiency" (paper)	Recognition of purchasing function, establishing standards	Master cost sheet showing - price - losses - inventory cost performance index

H.T. Lewis (1935) Industrial Purchasing	Recognition of purchasing function improve operational efficiency	Real measure is product-costs, inter-company indices
National Association of Purchasing Agents (NAPA) (1945) "Measuring the Efficiency of A Purchasing Department" (research-report)	---	Statistical measures and qualitative data, production cost, no mathematical formula of yardstick possible
S.F. Heinritz (1947) Purchasing	Improvement of purchasing proficiency and efficiency	Measure proficiency by costs vs. standard, measure efficiency by departmental operating budget; true measure of purchasing performance is end product costs; management audit
H.T. Lewis (1953) Procurement, Principles and Cases	Improve performance	Statistical data for tangible aspects, checklists for intangible aspects
A. Pleydell (1953) A Management Consultant looks at the Purchasing Department (papar)	Improve purchasing operations in light of company objectives	Statistical ratio's, checklists
J.H. Westing and I.V. Fine (1955) Industrial Purchasing, Buying for Industry and Budgetary Institutions	Improve performance, provide a method for rating individual performance	Measures for quality, quantity, price, time, place

A. Hodnett (1958) A Simple Way to Measure Purchasing Efficiency (paper)	Provide factual data on adherence to policy and procedure, utilization of purchasing personnel and price performance to back-up human evaluation	Use Statistical sampling
Dean Ammer (1958) "How to Measure Purchasing Performance" (paper)	Improve purchasing planning and control	Measurement against objectives
J. Petersen (1959) "Work Sampling Gauges Purchase Performance" (paper)	Improve work-speed of buyers	Performance indices
V. Pooler (1964) The Purchasing Man and His Job	Improve understanding of purchasing standards, improve buyer motivation	Management by objectives quantitative measures

Appendix 2: Additional information on statistical analyses

1. Introduction

This Appendix provides additional information on the tables, which are presented in Chapter Six. More specifically, for each cross-tabulation the Chi Square Test and the degree of significance are given.
The Chi Square Test is a statistical measure, which indicates whether or not there is a relationship between two research variables. The degree of significance indicates whether or not this relationship is statistically significant. Below a relationship has been indicated as significant, when $s \leq 0.05$. These relationships have been marked with an asterisk (*).

The Chi Square Test may be applied only when each cell of a cross-tabulation has a minimum of five observations.
In our analysis some tabulations did not meet this requirement. In these case we have redefined the number of classes of the specific research-variable in order to get a minimum of 5 observations. Where appropriate, we have indicated this.

2. Additional information

Table 6.2.: Purchasing's Share in Company Sales

$X^2 = 16.53268$ $s = 0.4164$

When redefined in three classes, the following picture emerges:

	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
<40%	12	40%	7	27%	5	31%	24	33%
40-60%	12	40%	8	31%	8	50%	28	39%
>60%	6	20%	11	42%	3	19%	20	28%
Total	30	100%	26	100%	16	100%	72	100%

$X^2 = 4.79843$ $s = 0.3086$

Apparently, a regrouping of the classes for the variable "purchasing share in company sales" leads to a similar conclusion as table 6.2. There is no significant relationship between this variable and company size.

Table 6.3.: Purchasing Responsibilities Related to Company Size

Purchasing Responsibilities	x^2	s
1. Inventory Control	2.78509	0.2484
2. Incoming Inspection	1.24956	0.5354
3. Materials Handling	3.351054	0.1872
4. Quality Control	0.41308	0.8134
5. Handling Complaints	NA	NA
6. Transportation	0.09573	0.9533
7. Handling Invoices	0.07356	0.9639
8. Other	4.52528	0.3396

Table 6.4.: Purchased Materials Assortment Related to Company Size

x^2 20.977914 $s = 0.0537$

Regrouping of purchasing assortment into 4 classes, lead to the following result:

Number of Different Purchases \ Company Size	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
1. <2500	2	17%	7	27%	5	30%	14	19%
2. 2500-5000	3	10%	6	23%	2	13%	11	15%
3. 5000-10.000	8	27%	10	38%	7	44%	25	35%
4. >10.000	17	57%	3	12%	2	13%	22	31%
Total	30	100%	26	100%	16	100%	72	100%

X^2 = 18.59592 s = 0.0049*

Regrouping did not lead to a stronger relationship between the two variables: however, it gained in terms of significance.

Table 6.5.: Purchasing Reporting Relationships

X^2 = 17.38377 s = 0.0264*

Table 6.6.: Purchasing Staff Related to Company Size

X^2 = 41.38601 s = 0.0002*

Regrouping of purchasing staff into 3 groups lead to the following results:

Company Size / Purchasing Staff	Large		Medium		Small		Total	
	abs	%	abs	%	abs	%	abs	%
≤ 5	4	13%	18	69%	14	88%	36	50%
6-10	13	43%	6	23%	1	6%	20	28%
≥ 11	13	43%	2	8%	1	6%	16	22%
Total	30	100%	26	100%	16	100%	72	100%

X^2 = 30.30292 s = 0.0001*

Regrouping does not change our conclusion. There is a significant relationship between company size and the number of purchasing people employed.

Table 6.7.: Degree of Computerization in Purchasing and Related Areas.

	X^2	s
1. Production Planning	7.26620	0.0264*
2. Inventory Management	5.79622	0.0551

3. Materials Req's Planning	4.53718	0.1035
4. Order Processing	5.14573	0.0763
5. Expediting	10.00738	0.0067*
6. Invoice Processing	8.22521	0.0164*
7. Purchasing Market Research	1.23801	0.5385
8. Listing Product File	3.08522	0.2138
9. Listing Supplier File	6.54670	0.0379*
10.Other	3.56772	0.1680

Table 6.8.: Formalized Purchasing Guidelines, Related to Company Size

$X^2 = 6.27771 \quad s = 0.0433^*$

Table 6.9.: "Who is involved in determining purchasing procedures and guidelines".

	x^2	s
1. Production Planning	0.47077	0.7903
2. Materials Management	2.14931	0.3414
3. General Management	1.52156	0.8228
4. Central Corporate Purchasing	3.26808	0.1951
5. Purchasing Management	1.79732	0.4071
6. Other	0.14402	0.9305

Table 6.10: Purchasing Budgets Related to Company Size.

$X^2 = 10.98110 \quad s = 0.0890$

Table 6.11.: Type of Measure Related to Company Size

	x^2	s
1. Cost Related Measures	3.89399	0.1427
2. Dept. Related Measures	10.13236	0.0063*
3. Buyer Related Measures	8.21798	0.0164*
4. Quality Related Measures	0.45659	0.7960
5. Delivery Related Measures	0.34265	0.8425

Table 6.12.: Cost Related Measures and Company Size

	X^2	s
1. Actual costs per product vs historical costs	3.50769	0.1731
2. Actual costs per product vs other supplier costs	1.12089	0.5710
3. Actual costs per product vs budgeted costs	0.20342	0.9033
4. Materials costs expressed as % of total endproduct	5.22906	0.0732
5. Materials costs related to purchasing turnover costs	1.83932	0.3987
6. Cost-avoidance	5.11387	0.0775
7. Cost-reduction	3.72115	0.1556
8. Other	2.88000	0.2369

Table 6.13.: Department Related Measures and Company Size

	X^2	s
1. ≠ purchased items	2.66374	0.2640
2. ≠ purchase order per period	8.76145	0.0131*
3. total purchasing turnover	6.57692	0.0373
4. total requests for quotations	7.36095	0.0252*
5. total cost reduction realized	3.97150	0.1373
6. total materials price increase	3.72115	0.1556
7. ≠ late deliveries	0.48894	0.7831
8. ≠ early shipments	1.17191	0.5566
9. ≠ supplier plant visits	4.86713	0.0877
10. ≠ returned deliveries	3.47518	0.1759
11. other	3.55317	0.1692

Table 6.14.: Buyer Related Measures and Company Size

	X^2	s
1. ≠ purchased items	13.26302	0.0013*
2. ≠ purchase orders per period	5.14637	0.0763
3. ≠ requests for quotations	2.89096	0.2356
4. purchasing turnover in Dfl.	4.87773	0.0873
5. cost reductions per period	3.39601	0.1830
6. average price increase % per buyer	12.60000	0.0018*
7. ≠ orders delivered in time	0.55750	0.7567

8. ≠ early deliveries	0.60132	0.7403
9. ≠ late deliveries	1.39206	0.4986
10.≠ supplier plant visits	3.47518	0.1759
11.≠ other	1.79415	0.4078

Table 6.15.: Quality Related Measures and Company Size

	X^2	s
1. ≠ productionstops due to purchased mat's.	0.08077	0.9604
2. ≠ returned deliveries	3.97150	0.1373
3. ≠ reworks + repairs	0.89309	0.6398
4. ≠ renewed orders	1.02564	0.5988

Table 6.16.: Delivery Related Measures and Company Size

	X^2	s
1. % timely deliveries	0.76484	0.6822
2. % early shipments	0.03803	0.9812
3. % late deliveries	0.78231	0.6763
4. % complete shipments	0.48671	0.7840
5. % incomplete shipments	1.77391	0.4119
6. % over-deliveries	1.77391	0.4119
7. other	0.52330	0.7698

3. Additional analysis

Below the results are stated from analyses, that have been conducted. However, cross-tabulations have not been presented in Chapter Six.

Type of Measures / Purchasing's share in company sales	<40%	40-60%	>60%
	X^2	s	
Cost-related measures	0.11520	0.9943	
Dept. Related Measures	3.01982	0.2209	
Buyer Related Measures	1.57544	0.4549	
Quality Related Measures	1.10571	0.5733	
Delivery Related Measures	7.95687	0.0187	

Type of Measure \ Purchasing Dept. Size	≤ 5	6-10	≥ 11
	$\bar{x}^2$	s	
Cost-related measures	8.16134	0.0169	
Dept. Related Measures	3.46500	0.1768	
Buyer Related Measures	4.69992	0.0954	
Quality Related Measures	0.72000	0.6977	
Delivery Related Measures	4.10407	0.1285	

Type of Measure \ Purchasing Reports to	Production Manager	Materials Manager	General Manager	Purchasing Manager	Other
	$\bar{x}^2$	s			
Cost Related Measures *	13.34036	0.0097			
Dept. Related Measures *	11.98155	0.0175			
Buyer Related Measures *	13.85383	0.0078			
Quality Related Measures	0.98719	0.9117			
Delivery Related Measures	4.76341	0.3124			

Type of Measure \ Production Process	Mass Production	Series Production	Batch Production
	$\bar{x}^2$	s	
Cost Related Measures *	7.81473	0.0500	
Dept. Related Measures	0.63833	0.8876	
Buyer Related Measures	1.53714	0.6737	
Quality Related Measures	1.03193	0.7935	
Delivery Related Measures	3.58291	0.3102	

Type of Measure \ Product Range	<2500	2500-5000	5000-10.000	10.000-20.000	20.000-30.000	30.000 - 50.000	>50.000
	$\bar{x}^2$		s				
Cost related Measures	7.11854		0.3100				
Dept. Related Measures	9.37683		0.1535				
Buyer Related Measures	4.53207		0.6551				
Quality Related Measures	6.29932		0.3905				
Delivery Related Measures	6.20545		0.4006				

Appendix 3: Additional information on some important purchasing performance measures in Dutch industry

This appendix provides actual information on some important purchasing performance ratio's. These data have been derived from our survey, conducted among 206 manufacturing industrial companies in The Netherlands (see also Van Weele (1983)).

More specifically, information is provided on:

- purchasing costs expressed as a percentage of purchasing turnover; a distinction has been made between large, medium-sized and smaller companies (see table I).

- average purchasing costs, expressed as a percentage of purchasing turnover; these data have been calculated for different industries (see Table II).

- number of purchasing employees, expressed as a percentage of total company employees; these data have also been calculated for different industries (see Table III).

Purchasing costs/ Purchasing turnover	Large				Medium				Small				Total			
	1977	1978	1979	1980	1977	1978	1979	1980	1977	1978	1979	1980	1977	1978	1979	1980
1. 0.1 - 0.5%	23.8	21.5	22.2	19.7	21.7	20.4	24.5	21.6	3.5	3.3	8.8	8.6	18.9	17.4	20.0	17.9
2. 0.6 - 1.0%	42.9	40.0	33.3	38.2	13.0	18.4	12.2	23.5	3.5	3.3	5.8	8.6	24.8	25.4	20.6	27.2
3. 1.1 - 1.5%	12.7	20.0	25.0	18.4	21.7	16.3	16.3	5.9	25.0	26.7	17.6	11.4	18.2	20.4	20.6	13.0
4. 1.6 - 2.0%	3.2	4.6	5.5	7.9	8.7	10.2	14.3	17.6	25.0	20.0	20.6	25.7	9.5	9.7	11.6	14.8
5. 2.1 - 2.5%	6.3	4.6	4.2	6.6	10.9	8.2	10.2	5.9	7.0	6.7	14.7	11.4	8.0	6.3	8.4	7.1
6. 2.6 - 3.0%	3.2	3.1	2.8	2.6	10.9	12.2	8.2	9.8	10.7	6.7	5.8	5.7	8.0	6.9	5.2	5.6
7. 3.1 - 4.0%	-	-	2.8	1.3	6.5	10.2	8.2	7.8	7.0	10.0	5.8	8.6	3.6	5.6	5.2	4.9
8. > 4.0%	6.7	6.1	4.2	5.2	6.5	4.1	6.1	7.8	17.7	23.4	20.5	19.9	8.8	9.1	8.4	9.3
Total	63	65	72	76	46	49	49	51	28	30	34	35	137	144	155	162
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table II Purchasing costs expressed as a percentage of purchasing turnover, related to company size.

	Type of Industry	%	Stand dev.	N
1.	Foods and Kindred Products	1.02%	1.82	26
2.	Textile Mill Products	1.59%	1.58	8
3.	Clothing Industries	0.93%	1.61	3
4.	Leather and Footwear	-	-	-
5.	Lumber and Wood Products, Furniture	2.25%	0.84	4
6.	Paper and Allied Products	1.06%	0.70	10
7.	Printing and Publishing	1.42%	1.59	14
8.	Oil Industry	3.03%	4.74	3
9.	Chemical and Allied Products	0.81%	0.66	22
10.	Synthetic Fiber Industry	0.65%	0.35	2
11.	Rubber and Plastic Industry	1.40%	1.18	8
12.	Construction Materials and Ceramics Industry	1.51%	2.18	8
13.	Primary Metals Industry	1.10%	-	1
14.	Fabricated Metals Industry	1.96%	2.75	29
15.	Machinery	1.15%	1.07	11
16.	Electronic Equipment Supplies	3.06%	2.76	18
17.	Transportation Industry	1.39%	1.04	9
18.	Optical Products and Instruments	2.06%	1.41	2
19.	Miscellaneous	1.40%	0.84	4

Table 11: Average Purchasing Costs Expressed as a Percentage of Total Purchasing Turnover

	Type of Industry	%	Stand dev.	N.
1.	Foods and Kindred Products	0.93%	1.04	30
2.	Textile Mill Products	1.00%	0.75	8
3.	Clothing Industries	1.33%	0.57	3
4.	Leather and Foodwear	-	-	-
5.	Lumber and Wood Products, Furniture	2.60%	2.60	5
6.	Paper and Allied Products	1.00%	2.73	12
7.	Printing and Publishing	0.78%	0.69	14
8.	Oil Industry	2.20%	2.77	5
9.	Chemical and Allied Products	1.13%	0.81	23
10.	Synthetic Fiber Industry	0.50%	0.70	2
11.	Rubber and Plastics Industry	1.11%	0.78	9
12.	Construction Materials and Ceramics Industry	1.10%	1.19	10
13.	Primary Metals Industry	2.00%	-	1
14.	Fabricated Metals Industry	1.20%	0.92	30
15.	Machinery	1.45%	0.93	11
16.	Electronic Equipment Supplies	1.17%	0.98	21
17.	Transportation Industry	1.22%	0.44	9
18.	Optical Products and Instruments	1.00%	1.41	2
19.	Miscellaneous	2.75%	2.87	4

Table III: Number of Purchasing Employees Expressed as a Percentage of Total Workforce (1980).

INFORMATION MATRIX

Aspects	1) Indicative prices and quotations		2) World Market prices	3) Normative standards		4) Indicators	
	unofficial market price, suggested list price, list price	quotation price paid by other locations	spot price producers' price forward price	precalculations	shadow calculation	semi government indices, such as, PPI, CPI, WPI	indices for cost price components
Accuracy	----------				----------→		----------→
Difficulty	easy, not expensive, not very time-consuming	easy, not expensive, not very time-consuming	easy, relatively not expensive, sometimes time-consuming	easy, relatively expensive, very time-consuming	difficult, relatively expensive, very time-consuming	easy, not expensive, not very time-consuming	easy, not expensive, not very time-consuming
Reliability	bad	very good	very good at short notice	excellent	excellent	moderate	good
Costs	moderate	moderate	high	very high	very high	very low	moderate
Validity	low only, few prices are published prices are always too high	low, says little about the price itself; gives no objective standard	high validity at short notice, moderate at long term	high, a uniform standard for suppliers	high, standard applies to one specific supplier	moderate, has a relative value	moderate says little about the price itself
At what level feasible	local (for plastic and metal components preferably, central)	local	central	local with central data bank	local with central bank preferred	local with central support	local with central support
Application	See decision matrix						
Examples	used cars, freights, listed articles' plastic and metal base materials	tools, finished products, packaging, plastic base materials	commodities, plastic and metal base materials	tools, finished products, packaging	tools, finished products, packaging	metals, solder, plastics, chemicals	finished products, packaging plastics
Price setting mainly based on	cost-as well as market factors		market-factors	cost-factors		market-factors	cost-factors

SUMMARY

The objectives of this study are generally twofold. The first objective is to identify what methods and techniques are used in Dutch industry to measure and evaluate purchasing performance and to identifie how these are valued by purchasing practitioners. The second objective has been to provide a conceptual framework, which can be used by purchasing practitioners to measure and evaluate purchasing activities.
This study has been confined to the purchasing activities of industrial companies. Furthermore, it primarily deals with purchasing performance measurement and evaluation at the operational level.
In order to achieve the objectives of this study, existing purchasing and management control literature was investigated to obtain an insight into the degree to which the subject of purchasing control had been covered. Our survey revealed various publications in these areas. Contemporaty industrial purchasing practice was covered by data results of two surveys among 206 resp. 72 industrial companies, located in The Netherlands.
Through these questionnaires information was obtained about the nature and techniques used to evaluate purchasing activities. Additional information on the actual use and practical value was obtained through in-depth interviews with purchasing managers and buyers of 23 industrial companies.

Considering the scope of our study, the study may be relevant for all those who are interested in industrial purchasing management. These may include general managers, purchasing practitioners and industrial marketing managers. Also researchers may find new ideas on purchasing control and some recommendations for future research.

The structure of this study is as follows.

Chapter One provides an introduction with a statement of the problem, the research methodology used, the scope and importance and the limitations of the study.

To gain a better understanding of how purchasing departments of industrial companies work, Chapter Two describes the elements of the purchasing management

process. Furthermore the purchasing planning cycle is discussed. Finally the purchasing process is commented on in this Chapter from a managerial and a marketing point of view.

Chapter Three describes some major contributions as developed in management control theory. Attention is given to the management-planning and control process, and to the levels of control as distinguished by several authors. Furthermore, the implications of management control theory for purchasing related issues are discussed.

Chapter Four deals with the question of who the main contributors were to the development of a theory of evaluating purchasing performance. The contributions of several authors are discussed as well as some empirical studies, which have been conducted in this field. Furthermore, in this Chapter an examination is made of the extent to which concepts as developed in management control theory are reflected in the purchasing literature on purchasing control.

Chapter Five presents an overview of the most important techniques found in literature to monitor purchasing prices, quality of incoming goods, timely delivery and delivered quantities. Limitations and benefits of the various methods are discussed here.

Chapter Six focueses on the empirical research, conducted within the scope of this study. Numerous techniques, found in a sample of 72 Dutch industrial companies to evaluate purchasing activities, are described. Some results of an additional survey among 206 Dutch companies are also presented here. Furthermore, attention is paid to the appreciation of these techniques by purchasing practitioners i.e. purchasing managers and individual buyers. Lastly in this Chapter, attention is given to the extent to which concepts, as developed in theory, to measure purchasing activities, are reflected in the methods and techniques used in industrial practice.

Based upon our literature survey and empirical research, Chapter Seven provides a conceptual approach for assessing and evaluating purchasing activities. Attention is given to such questions as: why should purchasing activities be measured and evaluated, and what problems occur in measuring and evaluating purchasing

activities. An attempt is made to define the concept of purchasing performance. For this purpose a distinction is made between purchasing effectiveness and efficiency. These concepts are broadened by discussing the goals and objectives of the purchasing function. As will be shown, purchasing's responsibilities and authority need to be enlarged in order for purchasing to contribute most to company performance.

The concepts, as developed in Chapter Seven, are materialized in Chapter Eight. In this Chapter new approaches are presented towards price performance measurement and evaluation, measuring purchasing's contribution towards the quality of purchased materials and controlling the incoming material flow.

As is demonstrated in Chapter Nine, purchasing performance cannot exist without reliable suppliers. In order to be able to produce efficiently, purchased materials and services need to be supplied in time and in the right quantities. Moreover, they should meet the required specifications.
Reliable suppliers are valuable assets to the company. Therefore their performance on delivery-reliability and quality should be closely monitored. In this respect several supplier evaluation systems are described in Chapter Nine.

In Chapter Ten the major conclusions of the study are summarized.

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Curriculum Vitae

Arjan J. van Weele (1954) presently is employed as assistant professor of marketing at Nijenrode, the Netherlands School of Business at Breukelen, Holland. Formerly, het worked as a research assistant at the Eindhoven University of Technology. Here, he got interested in purchasing management as a strategic area in industrial business.

He is co-project leader at a 20-day Seminar for Purchasing Managers of large, multinational companies, which is organized annually by the Dutch Association of Purchasing Management. Next to this he is also project leader of some general management programs, conducted at Nijenrode, the Netherlands School of Business.

His professional interests include strategic planning in industrial markets, improving purchasing performance in industrial organizations and purchasing management in general. Publications on these subjects have appeared in many national and international journals.

STELLINGEN

behorende bij het proefschrift

PURCHASING CONTROL: PERFORMANCE MEASUREMENT AND EVALUATION OF THE INDUSTRIAL PURCHASING FUNCTION

van

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I

Het meten en beoordelen van inkopers op basis van bepaalde criteria heeft grote invloed op hun gedrag. De ervaring leert dat zij zo hoog mogelijk ten aanzien van deze criteria willen scoren, ongeacht de vraag of dit in het belang van de onderneming is.

n.a.v. Ridgway, W.P., "Dysfunctional Consequences of Performance Measurement", Administrative Science Quarterly, Volume 1, No. 2, September 1956, pp. 240-247.

II

Bij de keuze van methoden en beoordelingsmaatstaven, die ter beoordeling van inkoopactiviteiten kunnen worden gebruikt, dient de vraag of deze kunnen leiden tot betere inkoopbeslissingen een belangrijker rol te spelen dan de graad van nauwkeurigheid, waarmee wordt gemeten. Het is echter het laatste aspect dat doorgaans de meeste aandacht krijgt.

n.a.v. Mason, R.O. en Swanson, E.B., "Measurement for Management Decision: A Perspective", California Management Review, Volume 21, No. 3, 1979, pp. 70 - 81.

III

Alvorens zijn onderzoeksplan in te dienen ter goedkeuring, zou iedere onderzoeker in de maatschappij-wetenschappen een stage op het gebied van zijn onderwerp van studie moeten doorbrengen in de praktijk. Het al dan niet gelopen hebben van een dergelijke stage zou een belangrijke overweging moeten zijn bij het toekennen van financiële middelen voor dat onderzoeksplan.

n.a.v. Bomers, G.B.J., "Ontwikkelingen in de Bedrijfskunde", Bedrijfskunde jrg. 55, 1983/1, pp. 84 - 94.

IV

Klantgerichtheid dient het uitgangspunt te zijn voor alle funktionele gebieden in een onderneming. Dit geldt ook voor non-profit organisaties.

n.a.v.: Peters, Th.J. and Waterman, R.H., "In Search of Excellence", Harper and Row, New York, 1982, pp. 156-199
Van der Hart, H.W.C., "Leveren zonder Prijssignaal", Eindhoven, 1982, pp. 248-255.

V

De wijze waarop methoden ter beoordeling van inkoopresultaten worden toegepast in de praktijk, valt eerder te verklaren door gedragsvariabelen in ogenschouw te nemen (zoals management stijl, persoonlijkheid van de inkoopmanager) dan struktuurvariabelen (zoals omvang van de onderneming, aard van het produktie-proces, omvang van de inkoopafdeling, inkoopomzetratio). De laatste krijgen doorgaans echter de meeste aandacht in de literatuur.

n.a.v. dissertatie pag. 136

VI

In vele ondernemingen wordt het meten en beoordelen van inkoopresultaten beschouwd als iets, dat op zichzelf staat, in plaats van als een activiteit die deel uitmaakt van het inkoopmanagement-proces. Dit feit vormt een belangrijke verklaring voor de geringe geloofwaardigheid, die in sommige ondernemingen gehecht wordt aan dit meten en beoordelen.

n.a.v. dissertatie pag. 19

VII

Er is geen universele methode denkbaar met behulp waarvan inkoopresultaten van industriële ondernemingen adequaat kunnen worden gemeten en beoordeeld. Methoden en beoordelingsmaatstaven, die voor dit doel worden gebruikt, zullen moeten worden toegesneden op individuele bedrijfssituaties.

n.a.v. dissertatie pag. 20

VIII

Vaak worden er kosthare, preventieve maatregelen genomen om problemen, die ontstaan als gevolg van slechte kwaliteit en lage leveringsbetrouwbaarheid van de zijde van leveranciers, te voorkomen. Dit is verontrustend omdat het management zich in die gevallen onvoldoende realiseert slechts de symptomen en niet de onderliggende oorzaken te bestrijden.

n.a.v. dissertatie p. 133

IX

De Nederlandse Vereniging voor Inkoop Efficiency streeft naar de erkenning van de inkoopfunctie als een ondernemingsgebied met een strategische waarde voor de individuele industriele onderneming. Echter door haar naam vertraadt zij een opvatting over inkoop, die rechtstreeks in tegenspraak is met hetgeen zij wenst te bereiken.

n.a.v. dissertatie p. 144 - 145

X

Het is bedenkelijk dat in Nederland voor sommige produkten TV-reclame niet is toegestaan, terwijl voor diezelfde produkten sport-sponsoring wel mogelijk is. Dit is meten met twee maten.

XI

Het in beperkte mate toelaten van vergelijkende reclame in Nederland gaat te ver indien supermarktketens het in hun advertentie gaan opnemen tegen plaatselijke middenstanders.

XII

Aanwezigheidsregistratie van staf-medewerkers mag niet beperkt blijven tot het zuiver registreren van aanwezigheid.