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Buying Behavior of Farmers

Maarten Kool

N08201.1833

STELLINGEN

NN01201, 1833.

1. Het inkoopgedrag van agrariërs wordt in algemene zin gekenmerkt door het streven om de koopbeslissing te vereenvoudigen en tijd te besparen.
Dit proefschrift

2. Ondanks het feit dat agrariërs over het algemeen worden gekenmerkt door veel herhaalaankopen, bieden de verschillen in leverancierstrouw de mogelijkheid tot een gedifferentieerde marketingstrategie.
Dit proefschrift

3. Een veel gehoorde stelling dat agrariërs voornamelijk op basis van emotionele c.q. irrationele gronden inkoopbeslissingen nemen, wordt niet ondersteund door theoretische argumenten en empirische onderzoeksresultaten.
Dit proefschrift

4. De betrokkenheid van bedrijfsleden bij inkoopbeslissingen wordt voornamelijk bepaald door variabelen waarmee een agrarische bedrijf getypeerd kan worden en is vrijwel onafhankelijk van de koopsituatie.
Dit proefschrift

5. Ketenmarketing is gedefinieerd als de gezamenlijke marketing-operatie van twee of meer opeenvolgende ondernemingen in een agrarische marketingkanaal die gericht is op een derde partij. Gegeven deze definitie is ketenmanagement een uitvloeisel van ketenmarketing.
Meulenberg, M.T.G. en M. Kool (1994), Chain Marketing of Agricultural Products. In: G. Hagelaar (ed.), *First International Congress on Chain Management*. Wageningen: Landbouwuniversiteit, Vakgroep Bedrijfskunde.

6. De huidige druk op de prijzen van A-merken toont aan dat consumenten hun koopbeslissingen rationeler nemen dan door marketeers wordt verondersteld.

7. Wie uit de leegloop van de kerken de conclusie trekt dat de kerken niet in de religieuze behoeften van mensen voorzien, doet een theologisch juiste uitspraak.

Becker, J.W. en R. Vink (1994), *Secularisatie in Nederland 1966 - 1991: de verandering van opvattingen en enkele gedragingen.* Rijswijk: SCP.

8. Natuurontwikkeling in de directe woon- en leefgebieden van mensen is milieuvriendelijker dan de ontwikkeling van natuur zoals voorgesteld in de ecologische hoofdstructuur.

Ministerie van Landbouw en Visserij (1989), *Natuurbeleidsplan: beleidsvoornemen.* Den Haag: SDU

9. Mensen met zeer progressieve denkbeelden zijn wat betreft de concrete toepassing van deze denkbeelden in de maatschappij zodanig dogmatisch dat ze altijd progressief blijven.

10. De behoefte aan zekerheid neemt toe naarmate men meer zekerheden heeft vergaard.

Maarten Kool

Buying behavior of farmers
Wageningen, 3 oktober 1994

BUYING BEHAVIOR OF FARMERS

MAARTEN KOOL

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BUYING BEHAVIOR OF FARMERS

MAARTEN KOOL

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in de landbouw- en milieuwetenschappen
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Voor mijn moeder

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CONTENTS

CHAPTER ONE

INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION

This thesis deals with the buying behavior of Dutch farmers. Purchasing has become an important management task on the farm. From 1980 to 1990, Dutch farmers spent an average of 60% or more of their farm revenues on inputs purchased from off-farm suppliers: arable farmers about 59%, dairy farmers about 62% and livestock farmers about 79% (LEI 1981-1991). In particular, purchasing has been affected by increased productivity and specialization. During this century, output per farm has expanded dramatically due to a continuous 'technology push': new breeds, new machinery and new production methods. Machinery is substituting labour and the use of various inputs (e.g. chemicals, compound feed, fertilizer) has been intensified.

The farm supply industry is confronted with an increasing level of competition as a result of three important trends: (1) stabilizing or shrinking markets; (2) internationalization; (3) shorter product life cycles. The negative development of the farm input market is, among others, caused by (a) decreasing number of farmers, (b) changes in the Common Agricultural Policy (CAP) of the European Community (EC), in particular the McSharry plan, which aims to diminish agricultural surpluses, and (c) decreasing prices for agricultural products. Moreover, the farm input market is characterized by increasing internationalization. In several regions, such as the EC and North America, trade barriers are lifted. Very large firms now tend to sell their products globally because of the unfavourable internal market situation. Finally, as a result of the growing speed of technological innovation, products become technically obsolete at a much faster rate. Consequently, producers of farm supplies are forced to cut down on the time-to-market by means of internal adaptation, such as multi-functional R&D teams and concurrent engineering, and external adaptations, such as strategic alliances and cooperations (Millson et al. 1992; Vesey 1992). Shorter product life cycles also increase the level of competition in the farm input market.

The above mentioned developments have increased the need for understanding farmers' buying behavior. In order to make real progress in this respect, a general framework of farmers' buying behavior is needed. More specifically, our theoretical knowledge with respect to the buying choices within a product category should be improved.

Many theories have been developed and much research has been done on the buying behavior of consumers and industrial buyers. Consumer behavior is concerned with the buying behavior of individual consumers or households who buy goods in order to gain satisfaction/utility. Industrial buying behavior is concerned with the buying behavior of organizations which buy goods for production purposes. Attention is generally focused on the buying behavior of formal organizations, being compartmentalized, pursuing functional specialization, and operating on the basis of prescribed policies and procedures.
Farmers' buying behavior can be perceived as a specific type of industrial buying behavior, because farmers buy inputs to produce farm products. However, the organizational context of farmers' buying behavior is completely different from the buying behavior of industrial companies. In Western societies, farms are in general small-scale businesses without compartmentalization and formalized procurement procedures. Management, including purchasing, is primarily the responsibility of the farmer, and the labour is provided by the farmer, his family and sometimes employees. Although the farmer often carries out the purchase, the buying decision can be made autonomously by the farmer or jointly with other family members. This buying situation is very similar to the buying decision-making within households. In this context, one member of the household does the shopping, but the whole family may decide about which products are bought. For this reason, farmers' buying behavior can be characterized as industrial buying behavior as far as the product is concerned and as households' buying behavior from the organizational point of view.
Another important aspect of the buying behavior of family farms is the interdependency between expenditures on household consumption and on means of production. Given a particular income level, an increase of the expenditures on farm production goes at the expense of expenditures on consumption and vice versa.
Although the buying behavior of consumers and industrial organizations is thoroughly investigated, there is a lack of theory and research with respect to the buying behavior of farmers. This study may contribute to increase our understanding of farmers' buying behavior. In this way, our analysis contributes to the understanding of the purchasing by small-scale family businesses. In order to develop a theory of

farmers' buying behavior, the theories and concepts of both industrial buying behavior and consumer behavior will be used and combined.

1.2 THE OBJECTIVES OF THE STUDY

In general, buying decisions involve at least two choices: (i) *product choice*, i.e. the decision to buy or not to buy a particular product (class); and (ii) *choice within a product class*, i.e. the selection of the specific product type, brand, and supplier within a product class (Sheth et al. 1992). This study is focused on the analysis of farmers' decision making processes with respect to choices within product classes, given that a purchase in the product class will be made. In the following, it is assumed that the farmer has a *buying problem*. The buying problem is defined here as the situation in which the farmer is convinced that he has to buy a certain input (good/service), and wherein he has to choose between a number of alternatives (different product types, brands and suppliers). This buying problem will be taken for granted and we will concentrate our research on the farmers' choice-making of a specific product in a product class.

The outcome of planning models in *farm management* refers to product choices, i.e. how much of a certain input should be purchased. For this reason, the analysis of farmers' choice-making within a product class is complementary to these planning models.

From the *marketing* point of view, the development of a theoretical framework of farmers' buying behavior requires a combination of theories and models concerning industrial buying behavior and consumer behavior. Although several authors have noted the similarities between industrial and household buying behavior (Woodside et al. 1977; Sheth 1979; Zaltman and Wallendorf 1979; Fern and Brown 1984), to the author's knowledge, no study has combined the models and theories of these two streams of marketing research, and which could enhance the understanding of the buying behavior of small-scale family businesses.

So far, only few scientific articles have focused on the decision making processes of farmers with respect to their choices within a product class. Studies have been carried out about farmers' purchase of tractors (Foxall 1979), herbicides (Funk 1980), fertilizer (Funk 1982), and broiler feed (Funk and Tarte 1978). These studies are, however, very descriptive and of limited scope. A general model of the buying behavior of farmers was not developed.

The objectives of this study are two-fold. Firstly, it develops a general model of farmers' buying behavior to identify key variables in this buying behavior and to provide a framework for their relationships and their function. Secondly, a number of hypotheses on farmers' buying behavior are empirically tested.

1.3 OUTLINE OF THE BOOK

The first objective of this study, the development of a general model of farmers' buying behavior, is covered in part I (chapters 2 to 4). In chapter 2, the context of farmers' buying decisions is discussed. Buying decisions are preceded by a number of choices concerning the allocation of available income. These choices determine the budget available to buy within a product class. A general framework is proposed for the farm income allocation process.
In the buying behavior literature, much attention is devoted to the decision making of industrial buyers and consumers regarding the choices within product classes. Some general characteristics of farmers' buying behavior are discussed in chapter 3 by positioning this behavior within the field of identified buying behaviors.
A general model of farmers' buying behavior with respect to their choices within product classes is proposed in chapter 4. This model is developed on the basis of concepts and theories on industrial buying behavior and consumer behavior. This chapter marks the end of the theoretical part of this study.

The second objective of this study, the empirical testing of a number of hypotheses on farmers' buying behavior, is covered in part II (chapters 5 to 11). In chapter 5, the structure of the empirical study is discussed. This chapter includes a discussion about the design of the empirical study, the sampling procedures, the field work and the operationalizations of the study's variables. Chapter 6 provides a justification of the method used to measure the influence of buying center members on farms.
According to the model proposed, farmers' buying behavior consists of three dimensions: (i) buying process, (ii) buying structure (decision making unit) and (iii) relationships with suppliers/loyalty to choice alternatives. On the basis of the general model, concrete hypotheses are proposed and tested using the data of the empirical study. The results are reported in the chapters 7 to 11. Four types of farmers were included in the empirical study, i.e. arable farming, dairy farming, pig farming and greenhouse market gardening. The buying behavior of these farmers was investigated with respect to a particular type of equipment (tractors, fertilizer spreader or

process-automation systems) or a financial loan, and with respect to a particular type of material (compound feed, crop protection products or fertilizers).
With respect to the buying process, our empirical study was focused on two important elements of the buying behavior: the extensiveness of the buying process and the use of information sources. Extensiveness of the buying process refers to the amount of cognitive and behavioral efforts farmers put into their buying process. The analyses of the extensiveness of the buying process are discussed in chapter 7. Farmers may use a great diversity of information sources during the buying process. The exploration of information sources is analyzed in chapter 8.
The buying structure or the decision-making unit on farms was investigated by analyzing the type of decision making, the size of the buying center and the composition of the buying center. Type of decision making, individual or joint decision making, is an important aspect of farmers' buying behavior, as buying decisions on farms are made within small groups. The size of the buying center is relevant if joint decision making occurs frequently. Analyses of the type of decision making and the buying center size are discussed in chapter 9. The influence of individual buying center members is analyzed in chapter 10.
With respect to the relationships with suppliers/loyalty to choice alternatives (brands and vendors), the empirical study was focused on vendor loyalty of farmers. Farmers may simplify complex purchasing tasks by buying products from the same vendor. It is essential to distinguish between true and spurious vendor loyalty. This distinction is made on the basis of two vendor loyalty dimensions, repeat buying behavior and commitment. Various types of farmer's vendor loyalty are analyzed by classifying farmers on the basis of these two vendor loyalty dimensions. Furthermore, concrete hypotheses concerning the relationships between the type of vendor loyalty and buying variables are tested. The results of these analyses are discussed in chapter 11.

Finally, part III (chapter 12) contains the implications of our investigation. Based on a summary and the synthesis of the major findings of the empirical study, we formulate conclusions about the buying behavior of farmers. Subsequently, we discuss the implications of our findings for the marketing of farm inputs. Finally, the major areas with respect to farmers' buying behavior are highlighted for future research.

PART I

THEORETICAL FRAMEWORK

CHAPTER TWO

THE CONTEXT OF FARMERS' BUYING DECISIONS

Farming purchases are preceded by a number of decisions concerning the allocation of available income. In this chapter, we propose a farm income allocation process consisting of three stages. The first stage of this process is the allocation of income to three categories: farm business expenditures, consumption expenditures, and savings. In the second stage, the budget allotment to each category is divided among product classes. Finally, in the third stage, the buying decision is made by selecting and buying an alternative within a product class. Thus, the choices made in the first two stages determine the budget constraints of the actual buying decisions. In section 2.1, an overview of the choices associated with farmers' buying behavior is discussed by presenting the farm income allocation process (FIAP). Some distinctive characteristics of the selection processes at the various stages of the FIAP are highlighted in section 2.2. Finally, in section 2.3, the FIAP is used to explain the differences between economic and behavioral approaches to farmers' buying behavior.

2.1 FARM INCOME ALLOCATION PROCESS (FIAP)

By purchasing products and/or services, farmers are allocating their farm revenues to various categories. It is unrealistic to assume that farmers take all buying decisions with respect to farm production and household consumption simultaneously. It is more likely that farmers follow a multi-stage procedure regarding the allocation of the total available income to specific purchases in which the broad allocation decision is refined into smaller ones.

Several authors in the economic and marketing literatures have proposed theories on how consumers or households allocate their available income. In the economic theory of consumer behavior, it is assumed that the consumer maximizes utility in two steps, i.e. a two-stage budgeting (Strotz 1957; Deaton and Muellbauer 1983). The first stage concerns an optimal allocation of the available income to broad com-

modity groups or expenditure categories corresponding to 'branches' of the utility function. The second stage implies the optimal allocation of each budget allotment to the various products or product classes within these expenditure categories. One particular branch of the utility function is then maximized, subject to the budget constraint for that branch. Weak separability of the utility function is a prerequisite for the consistency of this maximization procedure. Separability holds if the consumption set can be partitioned into groups so that preferences within groups can be described independently of the quantities in other groups (Leontief 1947). Depending on the specification of the product classes, this two-stage maximization procedure can be easily extended to more stages (Deaton and Müellbauer 1983).
While (macro-)economists in particular are interested in aggregated spending categories, marketers are particularly interested in how consumers or industrial buyers make choices within a product class. Complementary to the two-stage budgeting procedure, at least one additional stage has been proposed in the marketing literature (e.g. Olshavsky and Granbois 1979; Wierenga 1983; Van Tilburg 1984). This stage refers to the allocation within a product class: the choice of a product type, brand and/or supplier within the product class. In the marketing literature, theories and research on buying behavior are almost exclusively concentrated on this stage of the income allocation process. By evaluating consumers' prepurchase behavior, Olshavsky and Granbois (1979) split the third stage of the income allocation process into 'store patronage' (i.e. shopping and purchasing at specific shopping centers, stores, etc.), and 'brand purchase'.

Any analysis of the allocation of farm income has to account for the interdependence of farm production and consumption. Agricultural households often combine the household and the farm and consequently the farm income can be spent in both directions. Based on the foregoing discussion, we propose a farm income allocation process (FIAP) that consists of at least the following three stages (see figure 2.1):

1. *Allocation to production, consumption and savings:*
   The allocation of the available income to the categories farm expenditures, consumption expenditures, and savings.
2. *Generic allocation:*
   The allocation of farm expenditures to the categories of generic products, like tractors, buildings, compound feed, fertilizers, etc. This level involves the decision to buy or not to buy a particular generic product.

3. *Allocation within a product class:*
   The choice of a particular product type, supplier and brand within a product class, like tractors.

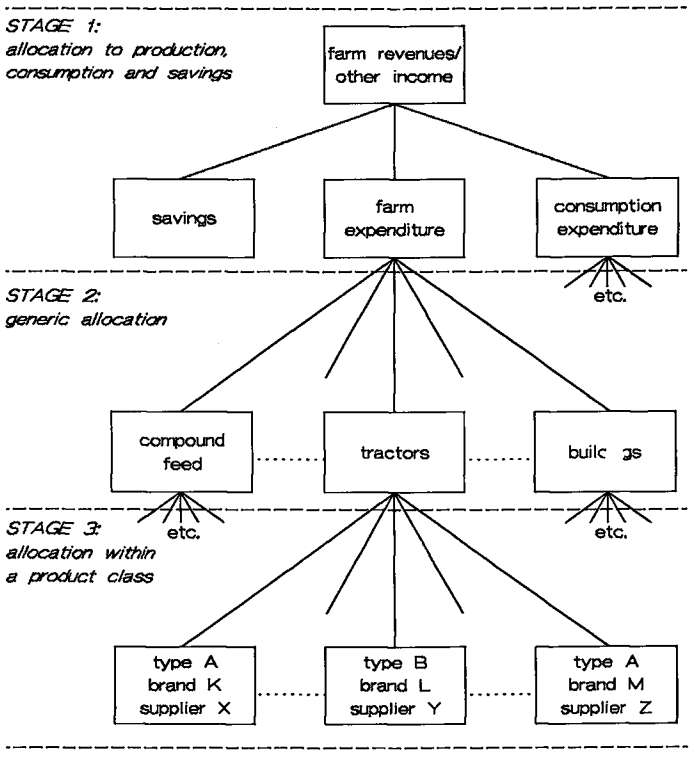

Figure 2.1 *A schematic picture of the Farm Income Allocation Process*

While the distinction of three stages in FIAP seems realistic, differentiation into more than three stages may be useful for some decision making processes. For instance, the number of stages in the FIAP can be extended by including a stage between the stages one and two, and which may refer to the allocation of farm expenditures to broad categories of production means like equipment, land, buildings, materials, and labour. Another extension could be the differentiation of stage three into two stages, i.e. product type choice and brand choice.
Notwithstanding the usefulness of more than three stages in the FIAP, we suggest that the three proposed stages sufficiently differentiate between the basic stages of

the farm income allocation process. The distinction of the first two stages is based on the assumption that the demand for a farm input depends on the prices of farm inputs and the budget allotment to other farm expenditures. This assumption implies that the effect of price changes of consumer goods enters the demand function for farm inputs through their effect on the farm budget. Stage three is distinguished from stage two because farmers are confronted with many alternatives within a product class after they have decided to buy a generic product.

The proposed FIAP differentiates between three basic decisions: (i) *budget decision*, decision concerning the budget allotment to the categories of farm production, household consumptions, and savings, (ii) *product decision*, decision to buy or not to buy in a particular class of products, and (iii) *buying decision*, actual selection and purchase of a specific alternative within the product class. Only the last decision materializes an actual purchase. The other two decisions determine the preconditions to the buying decision. In this study, the terms 'buying decision' or 'buying behavior' refer to decisions or behaviors in which an actual purchase is materialized. The realization of a purchase is always the last step of the buying process. The buying process only involves stage three of the FIAP, with, for example, an out-of-stock situation, a replacement of old equipment, or the appearance of a new type within the product class. If the budget allotment to the product class is sufficient, a farmer selects and purchases an alternative within the product class given the budget constraint. The buying process also involves stage two of the FIAP if, for example, the budget allotment to the product class is insufficient and a new allocation to product classes has to be made, and if a new product category arises as a result of an innovation. Finally, the buying process involves the whole FIAP if the need is activated due to substantial changes in type of farming and/or production method (e.g. the conversion of a dairy farm into an arable farm), or in case of a dramatic change in the total available farm income, and/or in case of a substantial capital (re)investment.

The hierarchy in the FIAP suggests that the selection of a particular supplier within a specific product class is independent of the supplier choice within any other product class. In practice, however, farmers buy various products from the same supplier. Consequently, a change in supplier of a particular product, for example compound feed, may also result in changing supplier for other products, such as fertilizers and crop protection products. Furthermore, the hierarchy in the FIAP does not include possible complementarity between products of different product classes, either. The choice of a certain product within a product class may imply the purchase of a particular product belonging to another product class.

From the marketing point of view, the last stage of the FIAP is the most interesting one. Industry and traders of farm supplies want to know how farmers choose a specific product type and/or brand within a product class. This choice determines the relative position of different suppliers in the market.

2.2 CHARACTERISTICS OF THE CHOICE-MAKING PROCESSES AT THE VARIOUS STAGES OF THE FIAP

In order to get a better understanding of the choice-making processes at the various stages of the FIAP, we will discuss the distinctive characteristics of these stages (table 2.1).

Table 2.1 *Some distinctive characteristics of the choice-making processes at various stages of the FIAP*

	Budget decision ..... *Product decision* ..... *Buying decision* *Stage 1* ..... *Stage 2* ..... *Stage 3*
Time span	Long ..... Short
Frequency	Low ..... High
Sunk Costs	High ..... Low
Consequences	Basic ..... Specific
Process Model	Deterministic ..... Stochastic

Time span and frequency

In the FIAP, allocation between production, consumption and savings is the highest level at which farmers' choice behavior can be analyzed. Budget decisions are strategic decisions and are made infrequently. These decisions concern long-term investments in land, buildings, equipment, and education (human capital) and fit a certain type of farming. The choice of these investments determines the annual farm expenditures to a large extent. Variable inputs are planned within the constraints of fixed resources. Given a particular type of farming and a particular production method, changes of input use occur more frequently due to substitutability of inputs. Minor shifts in the budget allocation are regularly caused by changes in output prices, input prices, and prices of consumption goods.

Besides the determination of annual farm expenditures due to long-term investments, a large part of the annual household expenditures is also non-discretionary. Part of

farm income must be allocated to basic needs, like food/beverage, clothing, housing, and medical care. Other consumption expenditures are fixed by farmers' preference for a particular life style. Many products in the transportation, personal care, household furnishings, recreation, education, and household operations are non-discretionary in this sense. They constitute the 'standard package' of a household, a set of products uniformly represented throughout a society (Olshavsky and Granbois 1979). Given the product decision to buy or not to buy in a particular product class, farmers make one or more buying decisions. Thus, buying decisions are made as often or more often than product decisions. Decision-making processes at stage three of the FIAP can be traced easily. A farmer who has decided to purchase a tractor, searches for information about the various alternatives, evaluates these, and tries to make the best choice. If products are bought frequently, such as compound feed and fertilizer, extended decision making processes do not occur at every transaction. In case of these products, farmers generally order the desired amount of product from the current supplier(s) without evaluating other alternatives.

Sunk costs and consequences

The 'sunk costs' of strategic decisions in stage one of the FIAP are very high, because wrong choices of long-term investments lead to very high financial losses. Budget allocations in a certain type of farming, say dairy farming, are lost if the farmer would shift to another type of farming, say pig raising.

Within the context of a particular type of farming and production method, the decision to buy a particular means of production in stage two of the FIAP is less fundamental and the sunk costs are also lower. Finally, the sunk costs of buying decisions in stage three are relatively low, since the choice of a particular brand/type of product from a particular supplier normally does not require the change of a great number of complementary products either. The consequences of buying decisions are very specific and concern only the budget allotment to the product itself.

Process Model

In the first stage of the FIAP, farmers choose between a small number of alternatives which are fundamental to farmers' business. Only a limited number of variables determine the outcome of budget decisions. For this reason, these choice-making processes are generally specified as deterministic models. At the other extreme, in stage three of the FIAP (i.e. choices within a product class), farmers are confronted with many alternatives, each of which is described by several attributes. Many factors determine farmers' choice behavior. Therefore, choice-making processes at this stage are often specified by stochastic models.

2.3 DIFFERENCES BETWEEN ECONOMIC AND BEHAVIORAL APPROACHES TO FARMERS' BUYING BEHAVIOR

The distinction of stages in the FIAP is especially for the enlightening of differentiation between economic and behavioral approaches to farmers' buying conduct. The neoclassical economic theory of farm production concentrates on the stages one and two of the FIAP. The production theory centers upon the three choices: (i) *what* to produce (which product or combination of products), (ii) *how much* to produce (the level of output), and (iii) *how* to produce (the combination of inputs used). Based on the production function and the prices of inputs and outputs, an optimal solution for each choice is determined simultaneously. The outcome of this analysis specifies inputs needed to produce a certain amount of output in order to maximize profits (Varian 1984; Chambers 1988). The study by Thijssen (1992) is a recent application of the production theory on analyzing the input demand of Dutch dairy farmers.
Although the production theory does not pay explicit attention to the first stage of the FIAP, investment decisions are based on the production decision concerning the choice of output and production method. The production decision determines which type of annual operating inputs and capital assets are needed on the farm. Investment decisions affect the assets in which the farmer should invest. Different procedures can be used to analyze the various types of investments because of differences in the timing of expenses and the associated returns (e.g. Emery and Finnerty 1991). Based on the theory of optimal investment decision (Hirschleifer 1958), an economic approach to the choices at stage one of the FIAP is possible by evaluating the theoretical allocation of income between present consumption and future consumption by either investing in farm business or by saving (see e.g. Mullen et al. 1988).
The concentration of the economic discipline on the first two stages of the FIAP is not without reason. Traditionally, for policy purposes, economists have been interested in the input demand at market level and the question of efficient use of scarce inputs with respect to farm production. At the level of generic product choice, the assumption of complete knowledge on the part of the decision-maker is not so unrealistic. Everyone knows what a tractor or compound feed is, but not everyone knows the specifics of all different alternatives in the market (all combinations of product types, brands, and suppliers).

At stage three, farmers are confronted with complex choice situations. Farmers are faced with a great number of alternatives, each presented by several attributes. Although the value of some of these attributes (e.g. price) can be accurately and efficiently evaluated prior to purchase, the value of many other attributes (e.g. after-

sales service) is difficult or impossible to evaluate prior to purchase. Many factors determine the choice of a particular alternative within a product class. Information must be sampled from various sources. A farmer may read brochures, articles, advertisements, and tests in magazines, or may obtain information from friends, family or salesmen. However, advertisements and salesmen usually focus on one brand and only present a favourable subset of the available information about that brand. A farmer may also observe alternatives used by others or draw upon his own experience.

The cognitive capabilities of farmers to cope with the complexities of the choice task in stage three are limited. In addition, farmers have a limited amount of discretionary time to spend on buying decisions. Thus, farmers have to be considered as limited information processors. They can not acquire and process the available information about all choice alternatives within a product class. Over the past thirty years, information processing by consumers regarding buying decisions has been studied thoroughly. These research efforts have greatly expanded our knowledge of the human information processing system. An important result of this research is that human beings have to be considered as limited information processors (see Bettman 1979 and Bettman et al. 1991). Since decision making with limitations to information processing occurs quite often, the concept of *bounded rationality* has been introduced (Simon 1955). This perspective, favoured by marketing scholars, assumes that decision makers intend to be rational, but are subjected to limitations like limited resources, information, and cognitive capacities.

In this study, the concept of bounded rationality is applied in order to understand farmers' decision making with respect to choices within product classes (stage three of the FIAP). We will focus our attention on *how* farmers make up their decisions given the limitations of cognitive capabilities and availability of discretionary time. Consequently farmers have to decide despite incomplete information, hence an optimal solution is not guaranteed.

CHAPTER THREE

GENERAL CHARACTERISTICS OF FARMERS' BUYING BEHAVIOR

Decision-making with regard to choices within a product class has been studied extensively in the marketing literature. Two main streams of research can be distinguished, i.e. consumer behavior and industrial buying behavior. Theories of these two types of buying behavior form the framework of our general model of farmers' buying behavior as will be proposed in chapter four.
This chapter describes some general characteristics of farmers' buying behavior. This characterization is based on the positioning of the farmers' buying behavior within a set of buying behaviors which are distinguished in the marketing theory. Traditionally, many marketing scholars have made a distinction between industrial buying behavior (IBB) and consumer behavior (CB). The IBB-CB dichotomy is discussed in section 3.1. This dichotomy, however, provides an inadequate classification scheme of buying behavior. Therefore, we propose a broader classification scheme on the basis of the three dimensions of buying behavior, i.e. buying process, buying structure and relationships with supplier/loyalty to choice alternatives. These dimensions will be discussed in section 3.2. Our new classification scheme will be proposed in section 3.3. Finally, in section 3.4, farmers' buying behavior is positioned within a set of buying behaviors classified on the basis of the newly proposed classification scheme.

3.1 THE IBB-CB DICHOTOMY

While several authors have noted the similarities between industrial and consumer buying behavior (e.g., Sheth 1979; Zaltman and Wallendorf 1979), many marketing academicians have emphasized the differences between these two types of buying behavior. These differences have led to a dichotomy between industrial buying behavior and consumer behavior (IBB-CB dichotomy). Separate theories and concepts have been developed for both types of buying behavior. The general dichotomy between industrial marketing and consumer marketing can be observed

both in the educational system and in the academic field. Acceptance of the IBB-CB dichotomy as a classification scheme requires the assignment of farmers' buying behavior to one of the two categories. Several authors have proposed characteristics which distinguish between industrial and consumer buying behavior. Table 3.1 presents the characteristics in which industrial buying behavior differs from consumer behavior.

Table 3.1 *An overview of the characteristics in which industrial buying behavior differs from consumer behavior*

Buyer Behavior Characteristics	- Formalized purchasing procedure: rational/task motives predominate, buying decisions are based on specifications, value analysis, and cost effectiveness [3,4,6,7,8] - The complexity of the buying process [2,3,8,9] - Multiple buying influences (decision making unit) [1,2,3,4,5,6,7,8,9,10] - Close buyer-seller relationships [3,4,6,7] - Competitive bidding and price negotiations are more likely to take place [1,3,4,6]
Buyer Characteristics	- Large buyers [4,5,6,8] - Technically qualified, knowledgeable and professional buyers [3,4,5,6,7] - Reciprocity [3,5,6,7,8] - Direct purchasing [3,4,5,6,7,8]
Product Characteristics	- Technical product complexity [1,2,4,7,9] - Customized products [1,7,10] - Service, product support activities, delivery, and availability are very important [1,2,3,7,8,9,10]
Market Characteristics	- Derived demand [3,4,5,8,9,10] - Fluctuating demand [4,5,7,8] - Inelastic demand [4,5,7,8] - Small number of large customers (oligopsonistic buying) [3,5,6,7,8] - Geographical concentration [3,5,6,7,8] - Buyer-seller interdependence [1,2,4,5,7,10]

1. Assael 1987 (CB)
2. Engel et al. 1986 (CB)
3. Haas 1989 (IM)
4. Hutt and Speh 1989 (IM)
5. Kotler 1991 (MM)
6. McCarthy and Perreault 1990 (MM)
7. Reeder et al. 1991 (IM)
8. Stanton et al. 1991 (MM)
9. Webster 1991 (IM)
10. Wilkie 1990 (CB)

IM = Industrial Marketing Management, MM = General Marketing Management, CB = Consumer Behavior

In order to compound table 3.1, a convenience sample of 10 marketing and buying behavior textbooks were reviewed. All these textbooks pay explicitly attention to the differences between industrial buying behavior/industrial marketing and consumer

behavior/consumer marketing. The four textbooks dealing with industrial marketing management (IM) are widely accepted within this field. The three textbooks dealing with general marketing management (MM) are 'marketing classics'. With respect to the three textbooks dealing with consumer behavior (CB), at least one chapter pays attention to industrial buying behavior. Table 3.1 provides a wide range of characteristics (but not exhaustively) about how industrial buying behavior differs from consumer behavior. The high degree of agreement between the different sources suggests that our table presents a reasonably complete list of distinct characteristics.

Although the IBB-CB dichotomy has been widely accepted in the marketing literature, this dichotomy as a classification scheme has been challenged by Fern and Brown (1984). On the basis of Hunt's (1976) criteria for evaluating classification schemata, they concluded that the IBB-CB dichotomy does not provide mutually exclusive or collectively exhaustive categories. Fern and Brown concluded that the differences within the two categories of the dichotomy are greater than the differences between them. Clear differences between industrial and consumer buying behavior can only be observed by comparing the typical examples in the two categories. A classification on the basis of typical examples, however, ignores the full spectrum of buying behavior and tends to obscure the basic similarities between the two categories of buying behavior (Sheth 1979).
As discussed in chapter one, farmers' buying behavior can not be classified exclusively into one of the two categories since it has similarities with both industrial and consumer buying behavior. We believe that a more general classification scheme based on the general dimensions of buying behavior can serve our purpose to classify farmers' buying behavior appropriately. Accordingly, we will suggest these general dimensions of buying behavior, in the next section.

3.2 THE DIMENSIONS OF BUYING BEHAVIOR

Nicosia and Wind (1977) emphasized the necessity to observe both *people* (alone and in groups) and *activities* to understand industrial buying decisions. The necessity to observe people arises from the widespread agreement that industrial buying often involves multiple participants. This notion has led to the development of the buying center concept (Robinson et al. 1967; Webster and Wind 1972a)[1]. The other aspect

[1]The buying center concept will be explored to greater depth in section 4.1.3.

of industrial buying decisions, i.e. activities, refers to what people do as individuals or as members of formal or informal groups. A myriad of activities can take place from the time at which a need for a product or service arises in the organization to the time of the purchase decision and its subsequent evaluation. In comprehensive models of industrial buying behavior (Robinson et al. 1967; Webster and Wind 1972b; Sheth 1973), both aspects, i.e. people and activities, are conceptualized although much emphasis is placed on the buying center (Ward and Webster 1991).

While reviewing the literature on consumer behavior, Bagozzi (1986) stated that "process" and "structure" are two important concepts which can be used to describe buying behavior phenomena. The *buying process* is the sequence of steps or stages a buying unit passes through (Bagozzi 1986). It refers to the activities a buying unit exhibits in the selection and purchase of an alternative from a product class. The *buying structure* is a set of entities (participants within the buying unit) and the relationships between them at any one point in time during the buying process (Bagozzi 1986). It refers to the individuals or members of (in)formal groups involved in the decision making process, i.e. the decision making unit. Traditionally, theories of consumer behavior concentrate on the buying process and the buying structure is mostly not under discussion, because the individual consumer is implicitly assumed to be the decision maker. Attention to the buying structure in the field of consumer research has increased, particularly since the study by Davis and Rigaux (1974) on the influence exerted by husbands and wives at different stages in the decision process. The increased interest for household decision-making can be demonstrated by the attention paid to this subject in recent handbooks on consumer behavior (e.g. Schiffman and Kanuk 1991; Assael 1992; Engel et al. 1992; Solomon 1992; Peter and Olson 1993).

Buying process and buying structure are the two basic dimensions by which the discrete purchase acts can be successfully described. However, these dimensions are inadequate to describe the entire complexity of the buying decisions, since the long-term aspects are neglected. The importance of the long-term aspects of buying behavior has been stressed in particular with respect to industrial buying behavior. During the 70s, several authors emphasized that discrete transactions between industrial buyers and sellers are imbedded in a long-term relationship between the respective organizations (Bonoma and Johnston 1978; Arndt 1979; Håkansson 1982). The short-term and long-term aspects of buying behavior were combined in the interaction model of the Industrial Marketing and Purchasing Group (IMP-group, Håkansson 1982) by making a distinction between two concepts with respect to the

interaction between buyers and sellers: *episodes* and *relationship*. Episodes involve concrete exchanges between two parties, like purchasing acts. Relationship is the long-term aspect of the interaction process which refers to mutual adaptations and commitment. Purchasing acts are conditioned by experiences from preceding periods integrated in the overall relationship. Therefore, the analysis of the relationship should include the dynamic effects of experiences of past decision making on present buying decisions. A similar approach is pursued in the analysis of brand loyalty of consumers. As stated by Wernerfeldt (1991, p. 231): "In particular, one can differentiate between timeless qualities of preferences and truly dynamic effects. This involves a conceptual distinction between brand purchase due to fit between personal tastes and brand attributes and brand purchase due to past purchase. Operationally, this corresponds to a distinction between unconditional choice probability and the incremental choice probability obtained by conditioning on past choice".

Because of the importance of relationships as an element of both industrial and consumer buying behavior, we suggest to add relationships as an additional dimension of buying behavior to those proposed by Bagozzi (1986). Hence, we distinguish three dimensions of buying behavior (see table 3.2): (i) buying process, (ii) buying structure, and (iii) relationship with supplier/loyalty to choice alternatives. *Buying process* refers to the activities a buying unit exhibits in the selection and purchase of an alternative from the product class. This dimension describes the "what" of a particular buying decision. The *buying structure* refers to the individuals or members of (in)formal groups involved in the decision making process, i.e. the decision-making unit and the relationships among members of the decision making unit. This dimension describes the "who" of a particular buying decision. Buying process and buying structure can be used to describe discrete purchase acts, i.e. the short-term aspects of buying decisions. The third dimension, *relationship with supplier/loyalty to choice alternatives*, refers to the long-term aspects of buying decisions. This dimension describes the "historical context" of a particular buying decision. Experiences with past buying decisions may result in certain levels of commitment to choice alternatives which conditions present and future decision making.

Table 3.2 *The three dimensions of buying behavior*

Dimension	Description
Buying process	"what": the activities of a buying unit in the selection and purchase of an alternative from the product class.
Buying structure	"who": the individuals involved in the decision making process, i.e. the decision making unit.
Relationships with suppliers/ loyalty to choice alternatives	"historical context": long-term aspects of buying decisions, i.e. commitment to choice alternatives based on experiences with past buying decisions.

3.3 A CLASSIFICATION SCHEME FOR TYPES OF BUYING BEHAVIOR

A classification scheme based on the three dimensions of buying behavior is elaborated upon in this section. The positioning of farmers' buying behavior will be determined in the next section.

Buying process

This dimension refers to the activities a buying unit exhibits in the selection and purchase of a product or service. The buying process may range from a pure problem solving process to a pure hedonic experiential process (Hirschman and Holbrook 1982; Holbrook and Hirschman 1982; Srinivasan 1987). These extreme types of buying processes are presented in table 3.3.

Table 3.3 *Range of buying processes*

Problem solving process	<——>	**Hedonic experiential process**
It is a deliberate, rational, analytical, and essentially cognitive process	<——>	It is a spontaneous, emotional, simultaneous, and holistic process
Buyer = 'thinker'	<——>	Buyer = 'feeler'
Goal-directed (extrinsic motivation)	<——>	An integral part of the experience itself (intrinsic motivation)
Utilitarian benefits	<——>	Benefits range from hedonic and aesthetic to emotional and symbolic
Emphasis on functional values	<——>	Emphasis on social, emotional and epistemic values

At the one extreme, i.e. *the problem solving process*, the buyer is a 'thinker' who goes about solving his buying problems in a rational and analytical way. These buying processes are most adequately described by the 'rational problem-solving models' in which the buyer is regarded as a deliberate, rational, and analytical decision maker who solves buying problems through a cognitive process. This behavior is assumed to be motivated by or purposively directed toward rational goals with an extrinsic value resulting from a means-end relationship (extrinsic motivation, Holbrook 1986). The emphasis of this buying process is on the least-total-cost solution to buying problems and the functional value of the alternatives. Functional value pertains to the ability of a product to perform its functional or utilitarian purposes (Sheth et al. 1991).

At the other extreme, i.e. *the hedonic experiential process*, the buyer is a 'feeler' who consumes or uses products for hedonic, experiential benefits. These benefits refer to the psychological relationship of the buyer/user with the product and range from hedonic (pleasure, fun) and aesthetic (beauty) to emotional (happiness, surprise, poignancy) and symbolic (self-identity, self-expression). The hedonic experiential process is a spontaneous, emotional, and holistic process and forms an integral part of the consumption/use experience itself. This behavior is assumed to be motivated by the appreciation of experiences with the product/service for its own sake, apart from more objective considerations (intrinsic motivation). The emphasis is on other values than the functional value, like social, emotional, and/or epistemic (curiosity and novelty-seeking) values. Examples of hedonic experiential behavior are exploratory behavior, cue-triggered impulse buying, and variety-seeking (Holbrook and Hirschman 1982; Sheth 1982; Srinivasan 1987).

In most situations, both utilitarian and hedonic benefits function simultaneously in a buying decision although in differing degrees (Ahtola 1985; Srinivasan 1985; Batra and Ahtola 1990). The buying process can be characterized by the dominance of either utilitarian or hedonic benefits. The problem-solving process is dominant in case of a buying decision which is principally performed for utilitarian reasons. A hedonic experiential process exhibits when buying decisions are solely determined by hedonic benefits. In case of a mix of utilitarian and hedonic/experiential benefits (either both low or both high) a mixed process is shown. It seems logical to expect that the dominance of one of these two types of benefits depends on product characteristics, personality characteristics, and situational characteristics (Srinivasan 1987).

In characterizing types of buying behavior, the restriction of external factors is an important discriminant. We assume that the problem-solving process will be

dominant if the buying decision is determined by external factors, such as specific output objectives, the use of specific (financial) resources, and/or is executed through formalized procurement procedures. In organizations, for example, the buying processes are prescribed by procedures and rules (formalized procurement procedures). The execution and/or the outcomes of the buying task are specified. These co-ordination mechanisms try to minimize the influence of the personal characteristics of the decision maker on the actual outcome of the buying process. In general, we expect that the restriction by external factors determines the amount of freedom to yield to hedonic experiential benefits.

Buying structure

This dimension refers to the individuals involved in the decision making process, i.e. the decision making unit. The buying structure may range from individual decision making, i.e. the buying decision is the completely autonomous act of one single member of the buying unit, to a large group decision making, i.e. many members of the buying unit are involved (Webster and Wind 1972b; Sheth 1973; Davis and Rigaux 1974; Sheth 1974). These extreme types of buying structures are presented in table 3.4.

Table 3.4 *Range of buying structures*

Large group decision making	<——————>	**Individual decision making**
Joint act of many persons	<——————>	Autonomous act of one person
Role specialization within the buying center	<——————>	All roles combined in one person
Group choice strategy	<——————>	Individual choice strategy
Conflict resolution	<——————>	No conflict resolution

At the one extreme, many members of the buying unit interact during the buying process. In order to understand the interpersonal influences within large decision making units, the buying center concept was introduced. In case of large buying centers, role specialization within the buying center may arise. Webster and Wind (1972a) noticed several distinct roles within the buying center: users, influencers, buyers, deciders, and gatekeepers. Grønhaug (1977) introduced the role of initiator. Buying roles are the assignment of (a subset of) activities to persons or groups. It is possible that several individuals occupy the same role within the buying center and

that one individual occupies two or more roles. All members of the buying center can be seen as influencers, but not all influencers occupy multiple roles. In large buying centers, the buying roles are divided among various individuals. In practice, buying centers consisting of more than ten individuals are not exceptional. For example, in a study by Johnston and Bonoma (1981b), the size of buying centers involved in purchasing capital equipment and services ranged from 3 to 28 (median was 7) and from 2 to 15 (median was 5) respectively. Large buying centers lead to complex communication and information processing networks. A group choice strategy has to be established in order to assess a group choice on the basis of individual preferences. Finally, interpersonal conflict often occurs in joint decision making. A group can use different decision making strategies for conflict resolution depending on the cause of the conflict (see section 4.1.3).
At the other extreme, the buying center consists of one person (individual decision making). All buying roles are occupied by one person. This situation occurs when an individual buys a product exclusively for individual use and the consequences of the buying-decision outcomes are solely experienced by him/her. Consequently, the individual must establish an individual choice strategy and conflict resolution is not under discussion.

It seems logical to expect that the size of the buying center depends on product and buyer characteristics (Sheth 1973; Webster and Wind 1972b). In characterizing the types of buying behavior, the degree of functional specialization and differentiation within the buying unit is assumed to be an important distinguishing factor (Johnston and Bonoma 1981a). A separate buying department leads to the division of the roles of buyer and seller. Moreover, in buying units with a high degree of functional specialization and differentiation, many different (groups of) individuals experience directly or indirectly the consequences of a certain buying decision. Consequently, these individuals want to be involved in the decision making process. Thus, the number of potential buying center members increases when the level of functional specialization and differentiation within the organization increases.

Relationships with suppliers/loyalty to choice alternatives (brands and vendors)

This dimension refers to the long-term aspects of buying decisions. Experiences with past buying decisions may result in a commitment to choice alternatives which condition present and future decision making. The nature of buyer-seller relationships may range from pure transactions to strategic alliances (Jackson 1985; Webster

1991; Gundlach and Murphy 1993). These extreme types of buying processes are presented in table 3.5.

Table 3.5 *Range of buyer-seller relationships*

Pure transactions	<——————>	**Strategic alliances**
Short-term orientation	<——————>	Long-term orientation
No switching costs	<——————>	High switching costs
Buyer and seller are independent	<——————>	Buyer and seller are highly interdependent
No mutual adjustments	<——————>	Mutual adjustment by long-term contractual arrangements

At the one extreme of this dimension, there are pure transactions. In this type of procurement, the buying is strictly focused on individual transactions (short-term orientation). There is virtually no risk for the buyer in terms of product performance or quality. In addition, no investment or other costs are associated with switching from one vendor to another. The seller and buyer incur no obligation towards one another beyond the delivery and payment for a product that meets the specifications. Both buyers and sellers rely completely on market forces. The pure transactions lead to independent relationships.
At the other extreme, there is a strategic alliance constituting a complex and enduring form of buyer-seller relationship involving a virtually total interdependence between the buyer and seller. In this situation, buyers purchase their total requirement from a single supplier over a stated time period. Strategic alliances arise when both buyers and sellers enter into and manage their commitment on a strategic basis under long-term contractual arrangements. Due to the many strategic links and interactions between the two parties, the switching costs and risks of these long-term buyer-seller relationships are very high.

Between the two extremes of this dimension, one encounters a whole range of relationships between buyers and sellers. The occurrence of certain buyer-seller relationships depend on market characteristics, product characteristics, buyer characteristics, and situational characteristics (Campbell 1985). The market structure is a determining factor in the buyer-seller relationships. Market structure refers to market characteristics that affect the nature of the competitive process (Clarkson and LeRoy Miller 1982). With respect to the buyer-seller relationships, the following

market characteristics are relevant: (i) the number of buyers and sellers and their size distribution, (ii) barriers and conditions of entry, and (iii) physical or subjective product differentiation (Campbell and Cunningham 1983; Campbell 1985; Cunningham and Homse 1986)[2].

Independent relationships will arise in case of (i) many small buyers and many small sellers, (ii) no product differentiation, and (iii) low entry barriers. Both buyers and sellers will try to keep the switching costs low in order to benefit from the competitive situation, i.e. pure transactions. If one buyer or one seller dominates the market combined with high entry barriers, the buyer-seller relationships are characterized by dependence of buyer or seller respectively. Due to the imbalance of power, the weak party tries to keep the switching costs low and maintain flexibility. For this reason, independent relationships also arise in market situations where the weak party has alternatives.

Interdependent relationships exist in cases of (i) few buyers and few sellers, (ii) each with sufficient demand/supply potential, (iii) a high degree of physical or subjective product differentiation and (iv) high entry barriers. The relative market power of both parties is comparable and they have both limited possibilities to change partners. This situation of buyer-seller interdependence will stimulate the establishment of close relationships. These relationships are often characterized by idiosyncratic investments by both parties and are often formalized in contractual agreements. Due to these investments and formal arrangements, switching costs for both parties will increase and the relationship may evolve into strong strategic alliances.

3.4 GENERAL CHARACTERISTICS OF FARMERS' BUYING BEHAVIOR

The general characteristics of farmers' buying behavior can in principle be derived from the structure of agricultural production. In the Netherlands, farm products are produced in small-scale production units. Most farms in the Netherlands are private businesses, i.e. sole proprietorships and partnerships (97%, see table 3.6). Characteristic of private businesses is that the owner(s) is (are) personally and individually responsible for all lawsuits and financial obligation arising from operating the farm. The majority of these businesses are sole proprietorships. Partnerships are amongst others used to arrange the succession of ownership of the farm (parent-child partnerships). Some husband-wife partnerships exist mainly for fiscal reasons. A minority

[2] The market structure as a determinant of farmers' buying behavior will be discussed more extensively in section 4.2.3.

(3%) of farm enterprises is organized as a private company. A private company is a legal "person" separate and apart from the corporation owners and management.

Table 3.6. *Legal forms of business organization of farms in the Netherlands (source: CBS, Landbouwtelling 1992)*

Types of farming	Private businesses (sole proprietorship and partnership)	Private company
Arable farms	98.3%	1.7%
Horticulture:		
• greenhouse market gardening	92.2%	7.8%
• other horticulture	95.9%	4.1%
Farms with grazing livestock:		
• dairy farms	99.8%	0.2%
• others with grazing livestock	95.9%	4.1%
Farms with non-grazing livestock	96.0%	4.0%
Other farms	98.0%	2.0%
Total	*97.0%*	*3.0%*

In general, farms in the Netherlands are small-scale family businesses without compartmentalization and formalized procurement procedures. On many farms in the Netherlands, the farmer is only assisted by his family in providing labour and management (see table 3.7). With the exception of greenhouse market gardening, family workers provide the greater part of the farm labour force on farms. The non-family workers provide less than a quarter of the farm labour force. Only on greenhouse market gardens the non-family workers are more important than the family workers. In general, farmers are the most important workers on the farm.

Table 3.7. *The contribution of family and non-family workers to the total farm labour force in the Netherlands (source: CBS, Landbouwtelling 1992)*

Types of farming	Family workers			Non-family workers
	farmer(s)	*spouse(s) of farmer(s)*	*other fam. members*	
Arable farms	70%	12%	5%	13%
Horticulture:				
• greenhouse market gardening	29%	8%	3%	60%
• other horticulture	45%	12%	5%	38%
Farms with grazing livestock:				
• dairy farms	69%	18%	9%	4%
• others with grazing livestock	73%	15%	5%	6%
Farms with non-grazing livestock	60%	19%	5%	16%
Other farms	57%	15%	7%	21%
Total	*57%*	*15%*	*6%*	*22%*

On the basis of its organizational context, some general characteristics of farmers' buying behavior can be derived.

Buying process

The farmers' purchase of production means is predominantly influenced by output requirements. The motivation of farmers to purchase means of production is primarily based on the production of farm produce (derived demand). Consequently, we expect that the problem-solving process is dominant since the buying decision is principally performed for functional reasons. Depending on the buying situation, the problem-solving efforts may vary from very extensive to routinized (see section 4.1). In particular, the buying process is a problem-solving process when the financial resources are limited. However, the human factor in farmers' buying decisions may be important too. The course of the buying process heavily depends on situational variables, since the buying process is not based on formalized procurement procedures. Besides, hedonic/experiential factors can play an important role in farmers' buying processes. Especially, when the various alternatives meet minimal functional requirements and/or when farmers perceive no differences on functional criteria between the acceptable choice alternatives, and thus, emotional and social criteria may become decisive. Finally, farmers may also pursue non-economic goals, such as status and prestige, in so far as the financial resources are adequate.

Based on the afore-mentioned discussion it may be argued that the farmers' buying process can be characterized as a problem-solving process, in which emotional and social criteria in addition to functional criteria may be important. The execution of purchases heavily depends on the situational variables due to an absence of formalized procurement procedures.

Buying structure

In general, various members of the farm family may be involved in the farm business. The farmer's family and the employees always experience directly or indirectly the consequences of a buying decision. For this reason, members of the farm family are motivated to get involved in the buying decisions.

Farm enterprises are characterized by a low degree of functional specialization/ differentiation of the individuals involved. In general, the farmer is well informed about all aspects of the farm. This characteristic of the farm enterprise decreases the number of potential buying center members. In order to avoid inefficiency in

decision making, we expect that only a few members of the farm family are involved in buying decisions. Buying decisions on farms will be made individually or in small decision making units. We expect that buying centers of more than three individuals are exceptional on Dutch family farms.
The limited size of the buying center accounts for the unimportance of group processes. Buying centers on farms are very informal. We expect that members of these buying centers are characterized by a cooperative behavior. The number of conflicts regarding buying problems are minimized, because these conflicts are mostly occurring between family members. If conflicts do arise, a cooperative behavior of the buying center members is expected since these members try to avoid instability within the farm family. Many buying roles are accumulated in one person, mostly in the farmer, although some buying roles may also be occupied by other members of the farm family.

Relationship with suppliers/loyalty to choice alternatives

Generally there are many buyers and generally only a few suppliers in farmers' input markets. The share of supplier's output taken out by an individual farmer is usually low, while the percentage of farmer's requirements purchased from one supplier is relatively high. The farmer's need for supplier's advice and expertise is also high. Although the production of farm inputs has to be tuned to the specific local conditions, which are to a limited extent interchangeable with other regions in the world, farm inputs are not tuned to the specific needs of the individual farmers. Thus, customization of farm inputs is limited. Finally, the entry barriers for many important farm inputs, like farm equipment and materials, are in general high. Therefore, individual farmers are generally faced with a relative weak market position. In order to overcome the weak market position, farmers may join in cooperative buying, i.e. farm input cooperatives. In combining the purchasing for a group of farmers, the farm purchasing cooperatives can exert a significant 'countervailing power' (Galbraith 1957) vis-à-vis a powerful supplier. Exertion of countervailing power was an important reason for the emergence of farm purchasing cooperatives (Ter Woorst 1966).
Because of their weak market position, we expect that individual farmers may be loyal to suppliers and/or brands, but they will try to keep the switching costs low. They will need the flexibility to compensate for the imbalance in market power. This tendency will keep the buyer-seller relationships in the agricultural input markets relatively independent. Although the position of the farmers vis-à-vis a farm purchasing cooperative is stronger and consequently there are more interdependent

relationships, these relationships are very different from the strategic alliance. In general, members of farm purchasing cooperatives are free to purchase inputs elsewhere (no contractual arrangements) and they have low switching costs. On the other hand, the mergers of farm purchasing cooperatives have made the relationships between individual farm members and their cooperative more distant.
Many farmers are loyal to brands and vendors because continuation of the current situation is an easy and time-saving buying strategy. Furthermore, contacts with vendors may be utilized as advice and expertise. Relationships of more than ten years are common, and many farmers never change their vendor (see chapter 10). However, it is important to note that these long-term relationships generally exist without contractual arrangement, so that the farmer always has the possibility to switch to another supplier.

Conclusion

The position of farmers' buying behavior viewed from the three proposed dimensions of buying behavior, is tentatively indicated in figure 3.1. Farmers' buying process is a problem-solving process, in which emotional and social criteria, besides functional criteria, can be important. Buying decisions on farms are made individually or in very small decision making units which are mostly smaller than four individuals. Finally, although farmers are very loyal to brands and vendors, the switching costs are generally low and the relationships are relatively independent.

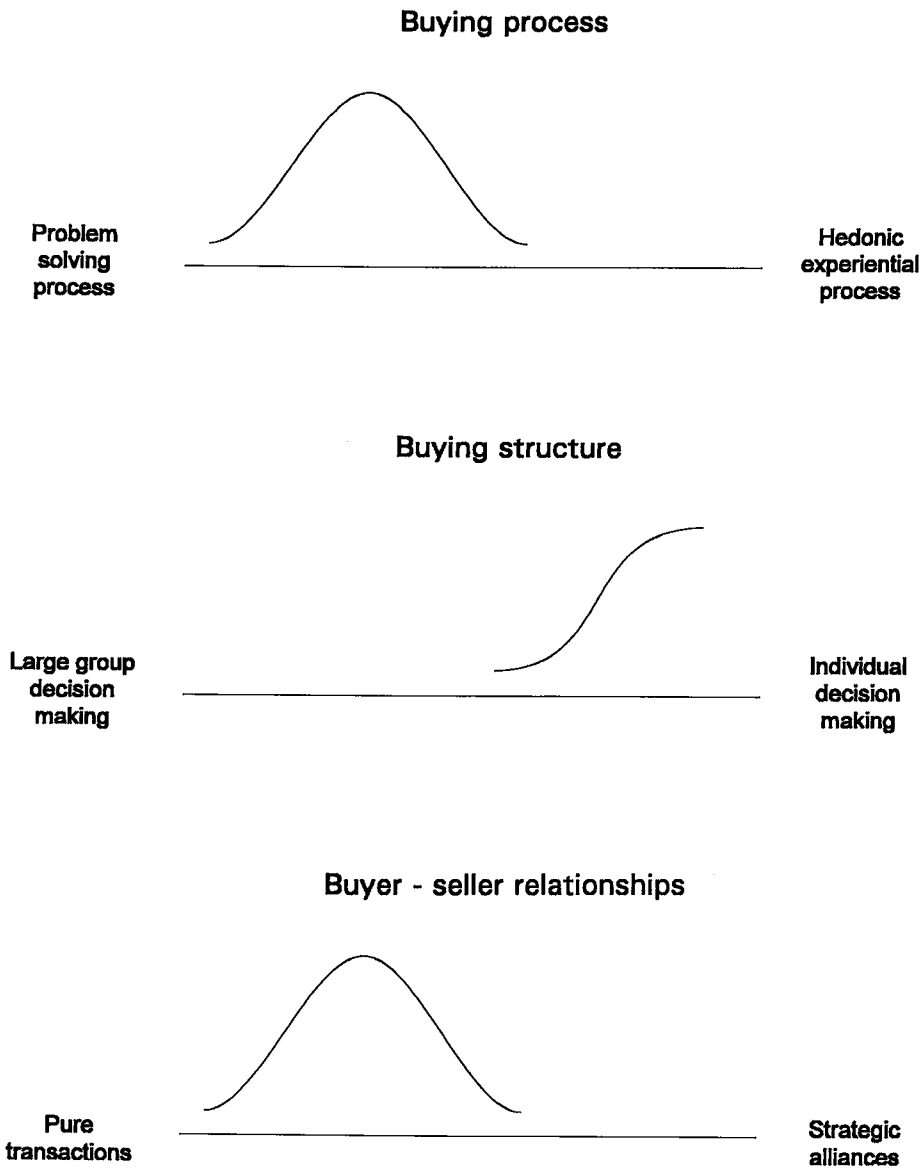

Figure 3.1 *Tentative position of farmers' buying behavior on the three dimensions of buying behavior*

CHAPTER FOUR

A GENERAL MODEL OF FARMERS' BUYING BEHAVIOR

4.1 INTRODUCTION

In this chapter, a farmers' buying behavior model is proposed. This model focuses on the allocation of farm income within a product class, i.e. stage three of the FIAP (see chapter two). We assume that farmers intend to behave rationally, but are subjected to limitations (bounded rationality). We focus on how farmers try to solve their buying problems given the limitations of cognitive capabilities and the availability of discretionary time.

In chapter three, farmers' buying behavior was characterized on the basis of the three dimensions of buying behavior. The farmers' buying process is a problem-solving process, in which emotional and social criteria in addition to functional criteria may be important. The execution of purchases heavily depends on situational variables because formalized procurement procedures are absent. As far as the buying structure is concerned, buying decisions on farms are made individually or in small decision making units which are mostly smaller than four individuals. With respect to relationships with suppliers/loyalty to choice alternatives, the switching costs are generally low and the relationships are relatively independent.

A model has been developed accounting for these characteristics of farmers' buying behavior. This model is based on the concepts and theories of both industrial and consumer buying behavior. In section 4.2, the dimensions of farmers' buying behavior will be discussed separately. Section 4.3 continues with the influence of both the buying task characteristics (product-related and market characteristics) and the buyer characteristics (farm enterprise and individual characteristics) on the dimensions of farmers' buying behavior. Section 4.4 deals with the general environment of farmers' buying behavior. These environmental influences complete the farmers' buying behavior model. Finally, this chapter ends with some concluding remarks.

4.2 DIMENSIONS OF FARMERS' BUYING BEHAVIOR

4.2.1 THE CORE MODEL OF FARMERS' BUYING BEHAVIOR

In line with other types of buying behavior, we distinguish three dimensions with respect to farmers' buying behavior, i.e. buying process, buying structure, and relationship with suppliers/loyalty to brands and vendors. A general characterization of farmers' buying behavior was discussed in chapter three by positioning this behavior within the field of buying behaviors. In this section, we discuss these dimensions in detail in the context of farmers' buying decisions.

The three dimensions of farmers' buying behavior constitute the core of our model (see figure 4.1). The buying problem is the starting point in this model. The buying problem is the situation in which the farmer is convinced that he has to purchase a certain input, and wherein he has to choose between a number of alternatives. The product choice, i.e. the decision to buy or not to buy a particular product (class), has already been made. Our model refers to choices within a product class. The outcome is the choice of a particular product type, brand, and supplier.

The three boxes in the center of figure 4.1 portray the three dimensions of farmers' buying behavior. Regarding a particular transaction, the buying process is embedded in the buying structure of the farm. While buying process and buying structure refer to discrete transactions, relationships with suppliers/loyalty to choice alternatives refer to more than one transaction. Figure 4.1 is a very simple graphical reproduction of farmers' buying behavior. In fact, every box contains a great many variables which can be used to describe and characterize the respective dimension. Finally, experiences with decision outcomes may alter subsequent decision making and/or subsequent buying problems (feedback-arrows).

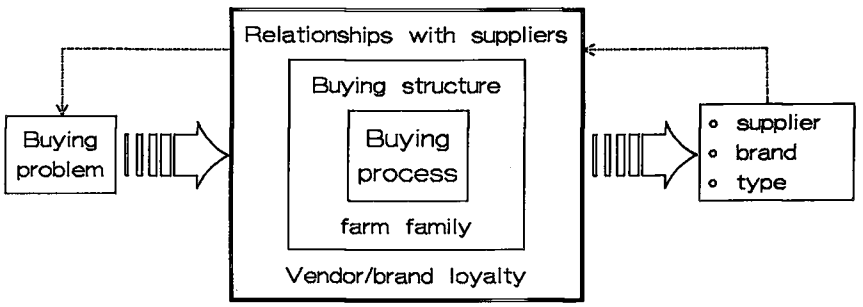

Figure 4.1 *The core model of farmers' buying behavior*

4.2.2 BUYING PROCESS

The buying process refers to the activities a buying unit exhibits in the selection and purchase of an alternative from a product class. In chapter three, we concluded that farmers' buying process can be characterized as a problem-solving process. The buying activities of a farmer are motivated or purposively directed towards rational goals with an extrinsic value resulting from a means-end relationship (extrinsic motivation). The emphasis of farmers' buying process is on least-cost-solutions to buying problems and consequently functional criteria are very important. However, emotional and social criteria may become decisive when the various alternatives meet minimal functional requirements and/or when farmers perceive no differences on functional criteria between the acceptable choice alternatives.

Theories about the buyer as a problem-solver are developed in the literature of both industrial and consumer buying behaviors. This section describes an application of these theories in the context of farmers' buying process. First, we will draw attention to the fact that farmers put a variable amount of cognitive and behavioral efforts into their buying process. Various levels of problem-solving activity are distinguished and described. The buying process consists of preparation activities and execution activities. In order to understand farmers' behavior regarding these activities, we make use of some theoretical concepts taken from the buying behavior literature.

Farmers' buying process as a problem-solving process

The problem-solving model is often applied to *consumer behavior* (Holbrook and Hirschman 1982). This model regards the buyer as a logical decision maker who solves problems by making buying decisions. The behavior of the buyer is motivated or purposively directed towards the goal of satisfying the needs and wants by obtaining goods/services. Important comprehensive models of problem-solving consumer behavior are constructed by Nicosia (1966), Engel et al. (1968), Howard and Sheth (1969), Bettman (1979), and Howard (1989). Even though there are some differences between these models of consumer behavior, they all have the two basic characteristics: process orientation and feedback through learning.
All theories on consumer behavior agree that consumers put variable amounts of cognitive and behavioral efforts into their buying process. Problem-solving effort varies from very extensive to routinized. For convenience sake, this continuum has been divided into three levels of problem-solving activity (e.g. Howard and Sheth 1969, Bettman 1979, Howard 1989, Engel et al. 1992, Peter and Olson 1993): *extensive problem solving* (EPS), *limited problem solving* (LPS), and *routine problem solving* (RPS). In case of EPS, consumers construct a goal hierarchy and a decision plan. Additionally, they exhibit substantial cognitive processing by extensively searching for choice alternatives and choice criteria, and they evaluate many choice alternatives. At the other extreme, in case of RPS, consumers activate an existing goal hierarchy and decision plan. They exhibit minimal cognitive processing by ignoring more or less their information search and their evaluation of alternatives. LPS falls somewhere between these extremes (Peter and Olson 1993). The various levels of problem-solving activity are an expression of *purchase involvement*. This type of involvement is the interest in the purchase process triggered by the need to consider a particular purchase (Mittal and Lee 1990).

All models of *industrial buying processes* are problem-solving models. Early models portrayed the industrial buyer as a 'rational buyer' who makes decisions based on an evaluation of all possible alternatives, the use of rational/objective criteria, and who maximizes profits by weighing the pay-offs associated with each alternative (Ward and Webster 1991). During the sixties, complementary to the 'rational buyer' models, other models of industrial buying behavior were developed based on works by Simon (1955) and Cyert and March (1963). These models recognized that decisions are made by human beings and that non-economic factors can be very important. They are rooted in psychology, social psychology, and sociology. By the seventies, researchers had integrated this research and its conceptualizations into

comprehensive models that attempted to specify most of the variables characterizing industrial buying behavior.

In a widely used decision process model, i.e. the BUYGRID model proposed by Robinson et al. (1967), the buying process depends on the buying situation. Robinson et al. conceptualized "buyclasses", which have become part of the standard lexicon in the study of industrial buying behavior: new task, modified rebuy, and straight rebuy. These conceptualizations of industrial buying processes are analogous to the EPS-RPS scheme in consumer behavior. New task is the most extended buying process, while straight rebuy is the most routine buying process. Three dimensions characterize the buyclasses: newness of the problem, information requirements, and consideration of new alternatives. Robinson et al. (1967) found that in practice the three dimensions are highly correlated and that only three buyclasses differ to a significant extent (see table 4.1). The continuum of the buying situations only depends on the relative newness of the problem (Robinson et al. 1967, p. 25).

Table 4.1 *The BUYGRID model of Robinson et al. (1967) of organizational purchases*

TYPE OF BUYING SITUATION (Buyclass)	*Newness of the Problem*	*Information Requirements*	*Consideration of New Alternatives*
New Task	High	Maximum	Important
Modified Rebuy	Medium	Moderate	Limited
Straight Rebuy	Low	Minimal	None

In agreement with the models of consumer and industrial buying processes, we expect that farmers also put a variable amount of cognitive and behavioral efforts into their buying processes. In accordance with the existing literature, we distinguish three levels of problem-solving activity: *extensive problem solving* (EPS), *limited problem solving* (LPS), and *routine problem solving* (RPS). Table 4.2 summarizes the major ways in which EPS and RPS differ.

In case of EPS, farmers define the need for the product/service with sufficient clarity to permit the drawing up of specification, including the objectives of the purchase. When the buying problem is specified, at least in preliminary fashion, farmers investigate the market. Farmers try to collect as much information as possible, both from memory (internal search) and from outside sources (external search), about the available alternatives and choice criteria. Each choice alternative is carefully evaluated and the selection of one alternative is made by profound choice

heuristics. Farmers have extensive negotiations with supplier(s). In general, EPS takes rather long periods of time.

Compared to EPS, LPS is usually more straightforward and simple. In case of LPS, farmers' buying process includes less information search and less rigorous evaluation of the choice alternatives. This type of buying process is usually carried out fairly quickly.

Although both extensive and limited problem solving involves some degree of information search and deliberation about choice alternatives, routine problem solving occurs relatively automatically with minimal apparent cognitive effort and with very little conscious control. In case of buying compound feed or pesticides, a farmer generally orders the desired amount of product from the current supplier without evaluating alternatives. Without further negotiation, the purchase is carried out within the conditions agreed upon. In case of buying problems involving RPS, farmers may compare the current supplier with alternative suppliers occasionally, for example once a year.

Table 4.2 *Levels of problem-solving activity of farmers*

Extensive Problem Solving	<——>	**Routine Problem Solving**
Extensive specification of the buying problem	<——>	No specification of the buying problem
Substantial search for choice alternatives	<——>	Little or no search for choice alternatives
Substantial search for choice criteria	<——>	Little or no search for choice criteria
Consideration of many choice alternatives	<——>	Consideration of a few, if any choice alternatives
Substantial evaluation of choice alternatives	<——>	Little or no evaluation of choice alternatives
Profound choice heuristics	<——>	Simple choice heuristics: buy the last purchased item
Extensive negotiation with supplier(s)	<——>	Little or no negotiation with supplier

Farmers' buying activities

Farmers' buying activities can be classified into two groups: (i) activities which prepare a farmer for the purchase of an input (*preparation activities*), and (ii) activities concerning the execution of a purchase (*execution activities*). Preparation

activities involve the specification of the buying problem, information search and evaluation of alternatives. Execution activities involves the choice of one alternative and the materialization of the decision. In order to understand farmers' buying behavior we have borrowed some theoretical concepts from the buying behavior literature.

Preparation activities

In order to make a buying decision, farmers generally process information from various information sources. Several information processing models are developed in the literature on consumer behavior. Recently, Peter and Olson (1993) developed a general information processing model, based on earlier models. Peter and Olson distinguish between two broad cognitive processes: interpretation and integration. *Interpretation processes* concern the way decision makers "make sense of or determine the meaning of important aspects of the physical and social environment as well as their own behaviors and internal affective state" (Peter and Olson 1993, p. 60). This process can be divided further into two highly related subprocesses: (i) attention, i.e. selection of stimuli to interpret by the cognitive system, and (ii) comprehension, i.e. creation of cognitive representation by the cognitive system. *Integration processes* concern the manner in which decision makers "combine and use information" (Peter and Olson 1993, p. 60). Two types of integration processes can be distinguished: (i) formation of an overall evaluative judgement of choice alternatives or attitude, and (ii) an intention to buy. Besides these two cognitive processes, the memory that contains interpreted information processed in the past is an important part of the information processing model.

This model is very useful for a proper understanding of the information processing by farmers. Farmers are continually exposed to information, so interpretation and integration processes operate continuously. When they encounter relevant information (attention), farmers interpret it in terms of interest, values, and knowledge (comprehension). The subjective meaning of information may be organized and stored in long-term memory as knowledge. Then, when a farmer tries to solve a buying problem, parts of this knowledge may be activated (retrieved from memory) for use in the interpretation processes. A farmer may also search for other types of information in the environment and the meaning of this information is also interpreted by comprehension processes. By making a buying decision, the different types of information are combined to form an overall evaluative judgment of choice alternatives or attitudes. Eventually, the various choice alternatives are evaluated and farmers make an intention to buy.

In general, farmers are faced with a great number of alternatives and a limited amount of discretionary time to make a buying decision. In such choice situations, the distinction of different choice sets (as proposed by Narayana and Markin, 1975) is very useful in understanding the evaluation of alternatives by farmers (see figure 4.2).

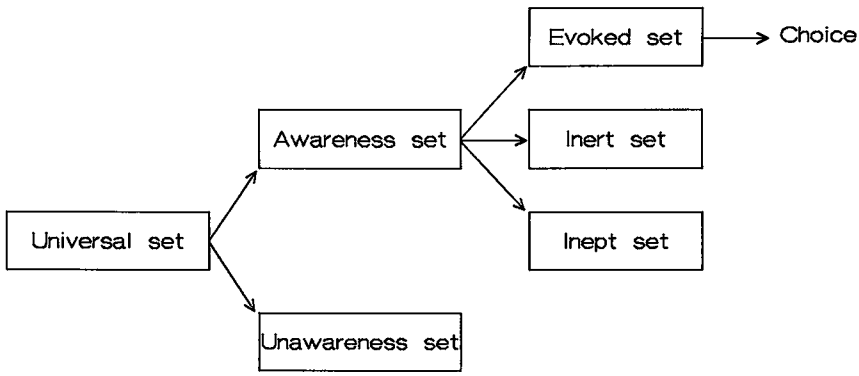

Figure 4.2 *Categorization process of farmers regarding choice alternatives based on Narayana and Markin (1975)*

The *universal set* refers to all alternatives available within a product class. The *awareness set* consists of the subset of alternatives in the universal set that have passed the attention threshold of farmers. Because farmers may not retrieve all alternatives from memory to which they have been exposed and because farmers may not be exposed to all alternatives during external search, the awareness set is usually smaller than the universal set. The *evoked set* consists of the subset of brands in the awareness set that are scrutinized carefully for a particular transaction. Since farmers may consider only a small subset of the awareness set, two other sets are important. The *inert set* consists of the alternatives of which a farmer is aware, but toward which his evaluation is neutral. These alternatives can move to the evoked set quite easily, although they are not important given the particular transaction. The *inept set* consists of the alternatives of which a farmer is aware, but rejects from a purchase consideration. Finally, one alternative is selected from the evoked set.
Figure 4.2 indicates that if a farmer is not aware of an alternative, it will not be considered or chosen. Moreover, an alternative to which a farmer has paid attention, may be rejected (inept set) or assigned to the neutral set. If an alternative is not included in the evoked set, the alternative cannot be chosen and consequently it is irrelevant to the choice.

Laroche et al. (1986) have extended this choice-set model of Narayana and Markin. They expanded the awareness set by proposing an unprocessed set besides three processed sets of alternatives including evoked, inert and inept set. However, the difference between unprocessed set and inert set is weak and it is difficult to discriminate between the various sets in an empirical study. Spiggle and Sewall (1987) also developed a choice-set model focusing on the choice of a store by consumers. They built upon and extended the trichotomy of brand sets proposed by Narayana and Markin. Consumer research has proved the existence of evoked sets containing a few alternatives, but not necessarily all alternatives with respect to buying decisions (e.g. Wierenga 1974; Narayana and Markin 1975; Hauser et al. 1983; Laroche et al. 1986; Hauser and Wernerfeldt 1990). This result indicates that decision makers tend to simplify their decision task by forming different sets of alternatives.

Execution activities

In order to select the appropriate alternative, a farmer may use different choice heuristics or a combination of choice heuristics. Choice heuristics are simple decision rules for comparing choice alternatives in order to choose one. Such decision rules are relevant in case of a choice problem, consisting of a set of alternatives, each described by values for several attributes. For each attribute, there may be an importance weight and a cut-off value specifying a minimal acceptable level for that attribute. A simple choice heuristic is to select the alternative which has been bought last time, whether the purchase was satisfactory.

One way to differentiate between decision rules is to divide them into *compensatory* and *non-compensatory rules*. Compensatory decision rules combine all evaluations on the choice criteria to form an overall evaluation toward each alternative. A negative evaluation on one criterion is compensated by a positive evaluation on another criterion. Separate evaluations for each evaluated alternative are aggregated and the highest-rated alternative is chosen. Compensatory decision rules are relatively complex choice heuristics. Non-compensatory decision rules are more simple heuristics, such as the satisficing heuristics (conjunctive and disjunctive), lexicographic heuristic, and elimination-by-aspect heuristic.

Bettman et al. (1991) presented a comprehensive overview of choice heuristics. They discussed general properties of each choice heuristic based on a number of characteristics: compensatory versus non-compensatory, consistent versus selective processing, amount of processing, form of processing (by attribute or by alternative), quantitative versus qualitative reasoning, and formation of evaluations.

When many alternatives are considered, we expect that farmers use a multi-phased strategy. First, relatively simple choice heuristics (in general non-compensatory decision rules) are used to narrow down the number of alternatives so that only a few alternative solutions remain feasible. After that, relatively profound choice heuristics (in general compensatory decision rules) are used to make the final decision. The same decision making strategy is found with respect to consumers (Lussier and Olshavsky 1979; Bettman and Park 1980; Johnson and Meyer 1984; Kardes et al. 1993) and industrial buyers (Crow et al. 1980; Vyas and Woodside 1984) when these buyers consider many alternatives. Hauser and Wernerfeldt (1990) showed that such behavior can be explained on rational grounds by the trade-off between incremental decision costs and benefits of choosing from a larger set of brands.
Especially in case of buying problems involving EPS, farmers solve these problems by making a sequence of choices, each of which eliminates certain alternatives from further consideration. The concept of 'creeping commitment' (Robinson et al. 1967) can be used to characterize this decision making: commitment to the final solution is becoming firmer and more specific during the buying process.

4.2.3 BUYING STRUCTURE

Buying center

Buying structure refers to the individuals or members of (in)formal groups involved in the decision making process, i.e. the decision making unit. The *buying center* is used as a concept to indicate the decision making unit. A buying center includes all individuals that participate in the buying process and that share the goals and the risks arising from that decision. This definition reveals the boundary and the domain of the buying center concept (Spekman and Grønhaug 1986). A buying center on farms may include farmers, spouses, other family members, and employees. Although salesmen, colleagues, or other external persons may participate in the buying process, they do not share the goals and risks arising from the decision. These external persons are considered as personal sources of information. In research on organizational buying centers, the boundary of the buying center could transcend the organization (e.g. Choffray and Lilien 1980; Lynn 1987, Banting et al. 1991). A similar situation may occur as to buying centers on farms in case of external persons who share the goals and risks arising from the buying decision with the farm family. Finally, the domain of the buying center is the buying process.

In chapter three, we concluded that buying decisions on farms are made individually or in small decision making units. We expect that buying centers consisting of more than three individuals are exceptional at Dutch family farms, since the farmer is well informed about all aspects of the farm and because of efficiency in decision making.

A basic issue by studying buying structures is the *type of decision making*, i.e. joint or autonomous decision making. Two similar models of Sheth on industrial buying behavior (Sheth 1973) and family buying behavior (Sheth 1974) are focused on the determinants of joint versus autonomous decisions. Sheth suggested that the type of decision making is determined by six situational variables: (1) product-specific variables, including time pressure, perceived risk, and type of purchase, and (2) company-specific variables, including size, orientation and degree of specialization. The influence of these variables on type of decision making by farmers will be discussed in greater detail in section 4.3.

Analysis of the buying center was the dominant research topic during the seventies and eighties with respect to industrial buying behavior. However, these studies were generally focused on buying centers within large organizations. Buying centers on family level have been described in the literature on household behavior. Although more than one person is often involved in buying consumer goods (Filialtraut and Ritchie 1980; Lackman and Lanasa 1993), many studies involving consumer decision making have implicitly assumed that one individual in the family makes all of the consumption choices for the family (Krampf et al. 1993). Consumer behavior literature has shown an increased interest in family buying behavior since a series of writings by Davis (1970; 1971; 1976) and since the article of Davis and Rigaux (1974). The decision role structure in households, expressed in the extent of role specialization and the relative influence of the spouses, has been described for a number of buying decisions (e.g. Davis and Rigaux 1974; Munsinger et al. 1975; Filialtraut and Ritchie 1980) and compared for different cultures (Green et al. 1983).

This section describes buying centers on farms. Since most theories are developed in the context of industrial organizations, these theories must be translated to the situation on farms. First, we pay attention to the structure of buying centers, followed by describing the relative influence of buying center members. Finally, group choice strategy and conflict resolution are discussed.

Structure of the buying center

Only in case of joint decision making, it is relevant to analyze the structure of the buying center. Many studies with respect to industrial buying behavior have been devoted to describing the structure of buying centers in terms of job functions, job categories and departments/management levels (e.g. Brand 1972; Johnston and Bonoma 1981b; Jackson et al. 1984; Lilien and Wong 1984; Naumann et al. 1984; Kohli 1989). Johnston and Bonoma (1981a) proposed a fundamental approach to study the structure of buying centers using five structural dimensions: (1) *lateral involvement*, total number of departments/functional areas exerting influence in the buying center; (2) *vertical involvement*, number of management levels represented in the buying center; (3) *extensivity*, total number of persons in the buying center; (4) *connectness*, number of direct communications between the buying center members; and (5) *centrality of the purchasing manager in the buying communication network.* The authors reported statistically significant relationships between a range of organizational and buying-situation variables and at least one dimension of buying center structure.

Within family farms, at least two functional areas can be distinguished: production unit and consumption unit. In general, the responsibility for each unit is divided among the spouses. The farmer is responsible for the production unit and his wife is responsible for the household. For this reason, it is interesting to study the involvement of the wife in buying centers for farm expenditures and the involvement of the farmer in buying centers for consumption expenditures (lateral involvement). The second structural dimension is not relevant in case of farms, since different management levels generally do not exist.

We expect that the degree of connectness of buying centers on farms is generally high because the degree of organizational formalization is low and the organization's centrality is high. The study of Johnston and Bonoma (1981a) showed that the degree of organizational formalization had a very strong negative effect on the buying center's connectness and that the amount of connectness was positively affected by the organization's centrality. Furthermore, direct links do exist between the various buying center members on farms.

More variation between buying centers of different farms can be expected with respect to extensivity and centrality of the purchasing manager in the buying communication network. As stated before, buying centers of more than three individuals are probably exceptional at Dutch family farms. Thus, the size of the buying center (extensivity) will vary between one and three. Finally, we expect that the buyer within the buying center on farms has a very central role in the communi-

cation network. In general, the farmer performs this role. He feels himself responsible for the purchase task on the farm and he discusses the purchase with other farm family members or employees when needed

The relative influence of buying center members

The bases of powers are important determinants of influence within buying groups (Thomas 1984; Kohli 1989). According to French and Raven (1959), power can be derived from an ability to reward (*reward power*), an ability to punish (*coercive power*), formal authority (*legitimate power*), relative expertise (*expert power*), and the projection of desirable associations (*referent power*). Reward and coercive power are sometimes viewed as representing a single dimension, namely *reinforcement power*, because it refers to the ability of an individual to mediate positive and negative reinforcements. In a study of 251 industrial buying centers, Kohli (1989) found that expert power is the most important influence determinant, followed by reinforcement power. He also found that the effectiveness of individual power bases depends on buying center size, viscidity of buying center, time pressure, and the strength of accompanying influence attempts. Thomas (1986) also found that expert power is an important influence determinant.

Based on these findings, we expect that the influence of buying center members on farms depends on the bases of power they possess, especially expert power. In general, the farmer possesses reinforcement, expert and legitimate power more than other farm family members and employees. Sometimes, farmers may possess referent power. Due to these bases of power, we expect that the farmer is the most dominant individual in the buying center. When a wife is heavily involved in the farm enterprise, she also possesses reinforcement and legitimate power towards other members of the farm family and employees, and consequently may be very influential in the buying center on farms. However, the wife's bases of power regarding buying decisions for the farm enterprise are smaller, when the farmer is responsible for the farm enterprise and the wife for the household. Furthermore, relative influence of the successor, usually one of the children of the farm family, may also be high because of the possession of expert and legitimate power. The influence of other children of the farm family is solely based on expert power (agricultural education).

Finally, studies on group decision-making indicated that the relative influence of buying center members is positively affected by the preference intensity (Corfman and Lehmann 1987; Corfman et al. 1990). If a buying center member strongly prefers a certain alternative, his/her relative influence increases. Thus, a buying

center member, for example the farmer, who has a very strong preference for a certain supplier, is able to impose his preference to the other buying center members.

Group choice strategy

Another important aspect of the joint decision making process is group choice strategy and conflict resolution. Group choice strategy refers to the assessment of a group choice by combining individual preferences. Based on research by Choffray and Lilien (1980), Wilson et al. (1991) proposed seven formal models to describe how buying centers can make supplier choice decisions. These seven models are categorized into three general classes based on the social decision scheme involved: (i) no-quota scheme (weighted probability model, equiprobability model, voting model, preference perturbation model), (ii) agreement quota scheme (majority rule model, unanimity model), (iii) individual decision scheme (autocracy model). Given the limited size of buying centers on farms, we expect that the individual decision scheme may be used commonly: one single member of the buying center is designated as the decision maker. Agreement quota schemes are useful models in conflict situations, since these schemes provide agreed procedures in case of individual differences of buying center members. However, many group choices on farms are made with a minimal amount of conflict, because of the familiar bonds between buying center members. No-quota schemes provide good models for these group choices.

In general, the use of social decision schemes depends on the number of persons participating in the farm and characteristics of the buying situation. In order to explain group choices in industrial buying, Wilson et al. (1991) also developed a contingency paradigm involving two situational factors, including the nature of the buying task and the degree of perceived risk. Their empirical study showed that the proposed paradigm leads to a significantly better prediction of group choice than any single choice model. We also expect that the group choice strategy of a buying center on a farm depends on familiarity with the buying problem and the degree of perceived risk (see section 4.3.2).

Conflict resolution

Interpersonal conflict often occurs in joint decision making. Conflicts arise from two sources: (i) the reasons for buying an item (buying motives), and (b) the evaluation of alternative choices (Sheth 1974; Davis 1976; Lackman and Lanasa 1993). Sheth

(1973; 1974) proposed various decision-making strategies depending on the cause of conflict. If conflicts are primarily due to disagreement on expectations or on specific criteria with which to evaluate suppliers, problem solving and persuasion are both useful and rational methods of conflict resolution. Nonrational and inefficient methods of conflict resolution, such as bargaining and politicking, are used in situations in which conflict arises as a consequence of fundamental differences in buying motives among the various parties or due to differences in styles of decision making. The buying unit suffers from the latter conflicts (Sheth 1973; 1974). Davis (1976) identified similar decision-making strategies and had similar predictions about the use of these strategies. Finally, Day et al. (1988) identified five conflict-handling styles based on a combination of two dimensions, i.e. the party's attempt to satisfy their own concern (assertive versus unassertive) and the party's attempt to satisfy the other's concern (cooperative versus uncooperative).

Depending on the origin of conflict, all kinds of decision-making strategies may occur in the buying centers on farms. The buying center members are also members of the farm family which have to reach decisions about many issues other than buying problems. Conflicts regarding buying problems are only one kind of potential conflicts within farm families. For this reason, the farm family may try to minimize the number of conflicts by using the role-structure strategy or budget strategy (Davis 1976), because many conflicts threaten the stability of the farm family. The role-structure strategy serves to lessen or even eliminate the need for discussion by making one person responsible for the decision. For example, the farmer is responsible for purchasing inputs for the farm. In the budget strategy, decision responsibility is controlled by an impersonal arbitrator. The conflicts are restricted to the moments of budget allotment which may occur for example once a month. Another strategy for conflict resolution is a muddling through process, where the buying decision is actually an intermittent process composed of a series of small decisions, e.g. how much to spend, when to purchase, which brands and vendors to select (Lackman and Lanasa 1993).

In spite of these strategies, conflicts in buying decisions and other conflicts will occur. Although these conflicts can be solved independently, it is also very likely that the solution in one conflict depends on the solution in another conflict. Studies of Corfman and Lehmann (1987) and Corfman et al. (1990) have shown that outcomes of past decisions affect the resolution of disagreements in future decisions when group member preferences are equally intense. Losers in prior decisions are more likely to win in the future and vice versa. This result confirms the expectations based on the equity theory (Corfman 1987). On the basis of this theory, we expect

that the gains are equalized over the various conflicts. These conflicts may occur both within and outside the domain of buying decisions. This equalization strategy increases the stability within the farm family since a negative outcome in one conflict is compensated by a positive outcome in another conflict.

4.2.4 RELATIONSHIPS WITH SUPPLIERS/LOYALTY TO CHOICE ALTERNATIVES

Relationships with suppliers and/or loyalty to choice alternatives refer to the long-term aspects of buying decisions. Experiences with past buying decisions may result in certain levels of commitment to choice alternatives which condition present and future decision making. The structure of farm input markets oblige farmers to maintain a relatively independent position vis-à-vis suppliers. Individual farmers are generally facing a relatively weak market position. They try to keep the switching costs low, because they need the flexibility to compensate the imbalance in market power. The position of farmers vis-à-vis a farm purchasing cooperative is in principle stronger, and consequently more interdependent relationships exist. However, member farmers of a cooperative are generally free to purchase inputs elsewhere. Besides, recent mergers of farm purchasing cooperatives have changed relationships between individual farmer members and their cooperative.
In the farm input market, vendor loyalty of farmers is an interesting phenomenon, because farmers tend to simplify their complex purchasing task and reduce perceived risk by buying products successively from the same vendor. This buying strategy is performed for at least three reasons. First, farmers have to combine the purchasing task with other management tasks on the farm. They can spend only a limited amount of the scarce discretionary time on purchasing. Second, farmers are continuously confronted with technical developments and improvements of the available inputs. Due to a lack of time, farmers cannot critically judge all these developments and improvements, and may utilize the contacts with their vendors as advice and expertise. A vendor change means that contacts are lost and that new contacts have to be established with associated costs. Finally, the comfort of not being forced to make a new choice (convenience) may be a third reason underlying high repeat buying activity of farmers. For a supplier of farm inputs, loyal customers are an important competitive advantage, since these customers are less vulnerable to marketing strategies of competitors.

Because of the expected importance of vendor loyalty in farm inputs markets, we pay attention to this phenomenon. Besides, we also discuss farmer-seller interactions on farm input markets.

Vendor loyalty

While the concept of loyalty has been used extensively in the marketing literature with respect to brands, stores and vendors, there is no consensus on a single definition. Colombo and Morrison (1989, p. 90) wrote with respect to brand loyalty that "only the researcher's imagination limits the number of plausible definitions". Since research in loyalty was originally focused on the *outcomes* of repeat buying behavior, definitions of brand loyalty referred to the behavioral dimension: repeat buying behavior. However measures based on overt buying acts do not distinguish between true and spurious loyalty (Day 1969; Jacoby and Kyner 1973). True vendor loyalty exists when repeat buying behavior is accompanied by a commitment to the vendor. Spurious vendor loyalty characterizes consistently selecting one vendor without commitment. Repeat buying behavior may result from a number of reasons other than commitment such as habit, a lack of decision making, a perceived absence of choice or a lack of time to evaluate other alternatives (more reasons are described by Jarvis and Wilcox 1977). Thus, true vendor loyalty is a specific type of repeat buying behavior.

Although the resultant behavior appears to be the same regardless of underlying cause, the distinction between true and spurious vendor loyalty is important from the marketing point of view. Farmer's reactions to marketing efforts of competing vendors differ depending on the factors underlying repeat buying behavior. More specifically, a truly loyal group of farmers is less likely to switch vendors as a result of competitive marketing efforts. On the other hand, farmers who merely exhibit repeat buying behavior without commitment would, over time, be more sensitive to competitive marketing activities. Due to a lack of commitment to a vendor, these farmers could well change in response to very small differences in for example price (Jarvis and Wilcox 1977; Assael 1987; Wernerfeldt 1991).

Failing to distinguish between true and spurious vendor loyalty may lead to erroneous marketing decisions. Vendor complacency may occur due to the seller's (erroneous) belief that high repurchase rates are indicative of customer satisfaction and commitment. Wrong conclusions based on overt buying behavior are easily made in case of marketing farm inputs, since farmers tend to buy their products successively from the same vendor.

Commitment to the vendor is the critical variable in distinguishing true from spurious vendor loyalty. Commitment is the preferential behavior towards one vendor out of a larger field of competing vendors based on conscious, explicit evaluations (Jacoby and Chestnut 1978). In effect, the farmer perceives 'his' vendor to be superior in many relevant criteria. These criteria may be related to either the product or the vendor. Commitment is characterized by future orientation and stability. It means a willingness to make short-term sacrifices to realize long-term benefits (Anderson and Weitz 1992). Because of this willingness, truly loyal farmers are less sensitive to competitors' marketing activities.

Farmer-seller interactions on farm input markets

By analyzing the relationships between two organizations on the industrial markets, a distinction is made between interactions on company level and individual level (Bonoma and Johnston 1978). However, with respect to relationships with farms, a distinction between the farmer, or individual level, and the firm level cannot generally be made. Relationships with farms are characterized by relationships at one level in which farmer characteristics are very important.

An interactive relationship between the farmer and the vendor ranges from a formal or business relationship to a close personal relationship. Formal relationships are mainly constrained by the role performance of both parties (e.g. vendor - customer, teacher - student), while personal relationships are mainly constrained by bilateral recognition and mutual knowledge (McCall 1970). A formal relationship can develop into a personal relationship, when both parties make idiosyncratic investments in the relationship. These investments refer to personal resources, such as money and time devoted to the relationship, which are difficult or impossible to redeploy to another relationship. Idiosyncratic investments by any party serve to intensify and personalize the relationship, and to gain confidence from the other party. Along with investment and confidence, commitment is developed and links the parties together (McCall 1970, Wilson and Mummalaneni 1986).
Personal relationships are developed through a relationship development process (Ford 1980; Dwyer et al. 1987). During this process, the farmer and supplier are both investing in the relationship and adapting themselves to each other so that a mutual commitment to the relationship arises. A farmer is confronted with high switching costs by changing vendors, if he has made a lot of specific investments, human and/or physical, in the relationship with the present vendor. Switching costs are high when a farmer has a personal relationship with the vendor. Therefore, the

existence of a personal relationship between the farmer and his vendor is positively related to true vendor loyalty.

Campbell (1985) developed a model of buyer-seller relationship based on the interplay of interaction strategies of the participating parties, classified as competitive, cooperative, and command. Campbell distinguishes three types of relationships: independent, dependent, and interdependent relationships. Independent relationships arise when both buyers and sellers use a competitive strategy due to the availability of enough other business partners. Interdependent relationships arise when both parties approach the relationship with a strategy of cooperation. Finally, dependent relationships result from the dominance which one party exerts over the other.
A farmer may exhibit a *competitive strategy*, in which he is taking advantage of market forces with respect to every discrete transaction. On the other hand, a farmer may exhibit a *cooperative strategy*, in which he is willing to establish a stable long-term relationship with a supplier, to exchange information openly, and to trust each other. A farmer cannot exhibit a command strategy, since it is very unlikely that he has a dominant position of strength in the farm input market. The choice of a competitive versus cooperative strategy depends on: (i) market characteristics, e.g. market structure and uncertainty, (ii) product-related characteristics, e.g. frequency of purchase, product importance and purchase complexity, and (iii) individual characteristics, e.g. preferred interaction style, risk attitude and relative familiarity (Campbell 1985). The influence of these variables on the interaction strategy of farmers is discussed in greater detail in the next section.

4.3 CHARACTERISTICS OF THE BUYING TASK AND THE BUYER AS DETERMINANTS OF FARMERS' BUYING BEHAVIOR

4.3.1 THE MODEL OF FARMERS' BUYING BEHAVIOR

Variations in farmers' buying behavior are caused by *buying task characteristics*, *buyer characteristics*, and influences of the *general environment*. While the influence of buying task characteristics and buyer characteristics on farmers' buying behavior is direct, environmental influences are subtle, pervasive and difficult to identify. In this section, we describe the influence of buying task characteristics and buyer characteristics on farmers' buying behavior.
Buying task characteristics consist of market characteristics and product-related characteristics. Buyer characteristics can also be divided into two sets representing

the farm enterprise and the individual. Thus, four determinants of farmers' buying behavior are proposed (see figure 4.3).

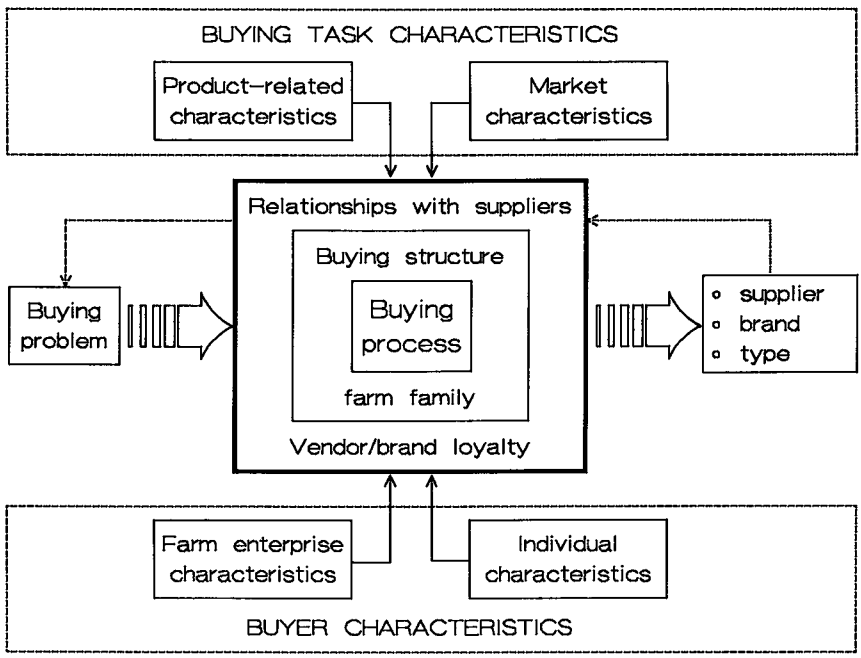

Figure 4.3 *Model of farmers' buying behavior*

The influence of these variables on farmers' buying behavior can be explained on the basis of a cost-benefit perspective (Punj and Stealin 1983; Srinivasan and Ratchford 1991). Farmers tend to enlarge their buying efforts as long as the perceived benefits exceed the perceived costs. High perceived costs of buying efforts are incurred in cases of high levels of problem-solving activity, of high problem-solving capacity (large decision making units), and of vendor change (switching costs). The perceived benefits of a particular way of buying inputs are: better decision making and better buying results. The perceived benefits depend on characteristics of the product, the market, and the buyer.

In this section, buying task characteristics, i.e. product-related and market characteristics, are analyzed first, and then followed by a discussion of the buyer characteristics, i.e. farm enterprise and individual characteristics.

4.3.2 PRODUCT-RELATED CHARACTERISTICS

Differences between products, which are relevant in relation to buying decisions can be used to characterize buying problems. Different writers have used different attributes in order to predict how a particular product or service is bought (see Campbell 1985; Möller and Laaksonen 1986). Our discussion will be focused on the type of product, the product life cycle, the purchase complexity, and the product importance (see figure 4.3a).

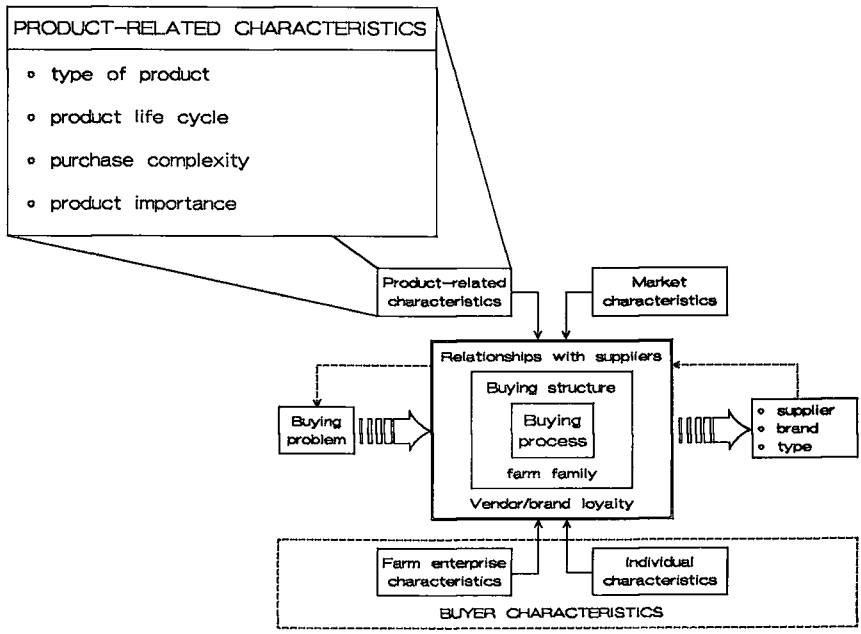

Figure 4.3a *Product-related characteristics as determinants of farmers' buying behavior*

Type of product

Farmers buy different types of products. On the basis of how products/services enter the production process (Hutt and Speh 1989; Reeder et al. 1991; Webster 1991), farm inputs can be classified into three groups. First, *materials* directly enter the product and become part of the finished good, like seed, compound feed, fertilizer. The costs of materials can unambiguously be assigned to the production process of a

particular output. Second, *equipment* or capital items have a useful lifetime of more than one year and they are used in the production process without becoming part of the finished product, like cowsheds, greenhouses, milking equipment, tractors, fertilizer-spreaders. Since equipment is used in multiple, subsequent production processes, a portion of the original costs is assigned to the production process as a depreciation expense. Third, *services and supplies* support the operations of the farm, like gasoline, lubricants, maintenance and repair items, extension services, financial services, insurances. Since these inputs do not become part of the finished product or support the production process, their costs can not be assigned to a particular production process. These costs are treated as operating expense items for the periods in which they are consumed.

Although this classification is useful to get a first impression of the various farm inputs, transaction frequency and the distinction between tangible goods and services are also important in relation to farmers' buying behavior. These two dimensions are discussed in greater detail.

Transaction frequency

Frequency of transaction distinguishes between the purchase of capital goods required infrequently and materials and supplies delivered more regularly. Where the transaction occurs frequently, i.e. more than once a year, farmers do not evaluate choice alternatives every time they have to order these goods. The purchase of these goods is perceived as a continuous operation and the buying process is characterized as routine problem-solving (RPS). In general, the buying activity of a transaction only consists of ordering the desired amount of product from the present vendor(s). The buying structure of inputs with high transaction frequency is simple. The user determines the moment of transaction (out-of-stock) and the buyer orders the product. Both roles are often performed by the farmer. Farmers may compare the current supplier with alternative suppliers occasionally, for example once a year, in order to keep themselves informed about alternatives and the market situation. Only during these evaluations, at least three roles can be distinguished within the buying center, i.e. user, buyer, and decider. Finally, the relationships between farmers and suppliers are likely to be more interdependent in case of inputs with high transaction frequency.

At the other extreme, infrequent purchase of goods always involves some degree of information search and deliberation among choice alternatives. Consequently, the buying process is often characterized as limited problem-solving (LPS) and sometimes extensive problem-solving (EPS). The buying center is an ad-hoc decision making unit which decides about the specific transaction. In general, infrequent

purchase of standard inputs is often dealt with by competitive tenders resulting in independent relationships with low switching costs

Tangible goods versus services

The distinction between tangible goods and services is based on the possession of certain attributes. A good or service can contain the following types of attributes (Nelson 1970; Darby and Karni 1973; Zeithaml 1981): (i) *search attributes* which can be determined and evaluated prior to purchasing a product; (ii) *experience attributes* which can be evaluated only after purchase and during consumption, (iii) *credence attributes* which are impossible to evaluate even after purchase and consumption. Many farm inputs are easy to evaluate before purchase because they possess many search attributes and only a few experience and credence attributes. In contrast, services possess only a few search attributes and many experience attributes and sometimes also many credence attributes. Thus, it is very difficult for a farmer to evaluate services before purchase because little adequate prepurchase information is available. Service evaluation occurs mainly after purchase and use (Young 1981). These differences between tangible goods and services have consequences for farmers' buying behavior. First, we expect that farmers exhibit fewer search activities in case of buying services than in case of tangible goods. Due to the experience and credence attributes of services, some information sources are not effective. In case of buying services, farmers prefer an opinion from personal sources, i.e. experiences of other farmers. A study by Murray (1991) on consumer information acquisition activities showed that the relative preference of personal sources is higher for services than for tangible goods. Second, in case of services compared with tangible goods, farmers may want to have more support from other family members while making the final decision with a view to the high prepurchase risk at the moment of choice caused by the low levels of prepurchase search (Murray 1991). Finally, a farmer may reduce perceived risk by choosing a well-known (reliable) choice alternative and a cooperative purchasing strategy in which he is willing to establish a long-term relationship with a supplier.

Product life cycle

Buyers are always learning about a product category, from the introduction of the first alternative throughout its life cycle. A product category is the group of choice alternatives that buyers view as very close substitutes to each other. Product life cycle (PLC) is a highly useful concept in terms of the theory of buyer behavior,

since buying behavior depends on the stage of the product in its life cycle (Howard 1989).

PLC and newness of the problem

Newness of the problem (novelty) is the unfamiliarity with the buying situation due to a lack of experience with similar purchase decisions on the part of the buying organization (Robinson et al. 1967, p. 25; McQuiston 1989, p. 69). Newness of the problem has been considered as an important determinant of buying behavior in the literature on industrial buying behavior (Robinson et al. 1967; Anderson et al. 1987; McQuiston 1989). Robinson et al. (1967) proposed that newness of the problem alone is the distinctive factor for their BUYGRID model. The less experience the buying center members have, the more unfamiliar the purchase is to them. Robinson et al. hypothesized that the extensiveness of the buying process is positively influenced by the newness of the problem. Recently, Anderson et al. (1987) found some support for this hypothesis. They found a strong association of newness of the problem with the amount of information desired by decision-makers, but only a weak correlation between these two variables and the tendency to consider new vendors.

Obviously, there is an association between newness of the problem and the stage of the PLC. However, newness of the problem is a multi-dimensional concept involving a product-related characteristic, i.e. stage of the PLC, and a buyer characteristic, i.e. buying experience of the farmer. Newness of the problem is high when the product is in the introductory stage of its PLC and/or the buying experience is low. These two dimensions are not independent. Since products in the introductory stage of their PLC are new to the market, a farmer cannot have much buying experience regarding these products. However, when a farmer buys a product in the maturity stage, he can have either much or no buying experience regarding this product. In this study, we use the two dimensions, i.e. stage of the PLC and buying experience, in stead of the newness of the problem. Now, we discuss the PLC in relation to farmers' buying behavior. The influence of buying experience on farmers' buying behavior will be discussed later (section 4.3.4).

PLC and types of problem solving

Howard (1989) hypothesized a relationship between the stages of the PLC and the type of problem solving by the buyer (EPS versus RPS). This relationship is based on the assumption that decision-makers like to simplify complex choice situations by a process of learning over time (*psychology of simplification*). Howard (1989) proposed that problem-solving effort decreases when products go through the PLC.

During the introductory stage, both product class and the choice alternatives within it are unfamiliar to buyers, and consequently their buying process is characterized as extensive problem solving (EPS). The amount of information needed is great and the speed in decision making is slow. Limited problem solving (LPS) occurs when decision makers are confronted with a familiar product class and a number of new unfamiliar alternatives. New alternatives in an existing product class are particularly introduced during the growth stage of the PLC because of the emergence of new competitors and the introduction of new product features. Finally, during the maturity stage, decision makers are confronted with both a familiar product class and choice alternatives, and routine problem solving (RPS) occurs. Consumers hardly need information and time to make the decision (Howard 1989). The hypothesized relationship between the stage of the PLC and the type of problem solving is confirmed by means of a number of studies focused on consumers' search behavior (Howard 1989, p. 20-23).

We expect that farmers are actually learning the concepts or the images, first of the product category and then of the alternatives within the category. Consequently, the level of problem-solving activity moves from EPS to RPS when products go through the PLC. Farmers' problem-solving effort is most extended during the introductory stage. Both product class and choice alternatives are unfamiliar and consequently the information requirements are high. Farmers who buy the product in the introduction stage have to rely on an external information search due to a lack of experience. In contrast, the problem-solving effort is least extended during the maturity stage of the PLC. In the latter situation, farmers are familiar with the product category, even if they have little buying experience.

PLC and type of buyers

Farmers who buy the product in the introduction or early growth stage of the PLC are innovators or early adopters of a product. Research on innovations has shown that early adopters are different types of buyers than later adopters. Early adopters differ from other adopters of an innovation in terms of (i) socio-economic status, e.g. higher education, more literate, higher social status, larger-sized units, more specialized operations; (ii) personality variables, e.g. greater empathy, less dogmatism, greater rationality and intelligence, less risk aversion, higher aspiration levels; (iii) communication behavior, e.g. more social participation, higher orientation outside the social system, greater exposure to mass media and interpersonal communications, more external information search (Rogers 1983). For this reason we expect that those farmers who buy products in the introduction stage put in more problem-solving effort to buy the product, use more information sources, and rely

on relatively more information sources like the extension service, farm magazines and bulletins (Ozanne and Churchill 1971; Rogers 1983).

PLC and buying structure

The higher the prepurchase uncertainty when buying products early in the PLC, the more problem-solving capacity is required, i.e. larger buying centers. The farmer may use the opinions of other family members in order to make the correct decision. As such, the farmer divides his buying responsibility among the various buying center members. Buying decisions concerning products in the maturity stage of the PLC are easier to handle and require less problem-solving capacity.

With respect to industrial buying behavior, the expected positive influence of novelty on the joint decision making, as proposed by Sheth (1973), is empirically supported by studies by Grønhaug (1975), Doyle et al. (1979), McQuiston (1989), Wilson et al. (1991). In the same context, empirical evidence for the relationship between newness of the problem and size of the buying center is not consistent. On the one hand, this relationship is demonstrated by studies by Crow and Lidquist (1985), Anderson et al. (1987), McQuiston (1989), and McWilliams et al. (1992), on the other hand, however, Johnston and Bonoma (1981a) and Lynn (1987) did not find a statistically significant relationship.

Another hypothesis contrary to the previous one is that when buying innovative products no member of the farm family is capable of making an adequate evaluation of the new product. In particular, the farmers' wife and other relatives are not able to contribute to the decision and they leave the decision up to the farmer who is most knowledgeable in the field. In contrast, when buying products in the maturity stage of its PLC, expertise is less essential in making buying decisions, since these products are familiar. The final buying decision is more determined by less critical attributes like shape, colour, status, etc., of which other members of the farm family besides the farmer may have an opinion. Consequently, these family members may be involved in de buying process.

PLC and vendor loyalty

Vendors possess valuable knowledge about innovative products, which farmers lack. Since only a few colleagues use these products, the farmer is more dependent on information from the vendor. Due to this dependency on supplier's knowledge, a relationship arises in which the farmer is committed to his vendor. True vendor loyalty is the consequence of the farmers' dependency on supplier's knowledge.

Moreover, standard products normally have lower switching costs than customized products. Whereas products become more standardized as they go through the PLC,

switching costs are therefore higher in case of innovative products. As a result of these switching costs, farmers may commit themselves to a trustful vendor leading to true vendor loyalty, or they may choose a familiar vendor with whom they have much positive experience concerning other products. In the maturity stage of the PLC, farmers may switch easily from one to another supplier since the products are standardized and the knowledge of the supplier is less vital.

Purchase complexity

Purchase complexity is the perceived lack of information relevant to buying a product (McQuiston 1989; Bunn 1993). By reviewing the literature, McQuiston (1989) concluded that researchers actually have used two different concepts in studying the 'complexity' and its impact on industrial buying behavior: purchase complexity and the technical complexity of the product. The latter concept is nested in the former concept, since the purchase complexity is, among other things, affected by the technical complexity of the product. In the context of farmers' buying behavior, we focus on purchase complexity as a determinant of farmers' buying behavior.

Purchase complexity and perceived risk

An increased purchase complexity leads to a greater uncertainty with the members of the decision-making unit. If a farmer perceives a lack of information relevant to buying a product, he is uncertain about the outcomes of his buying decision. This task uncertainty leads to high levels of perceived risk. Since the introduction of the perceived risk concept in marketing by Bauer (1960), much research has been carried out utilizing the ideas of risk and risk reduction processes in industrial and consumer buying behavior (e.g., Cox 1967; Bettman 1973; Håkansson and Wootz 1975; Newall 1977; Gemünden 1985). This perceived risk theory can be used to understand the influence of purchase complexity on farmers' buying behavior.

Purchasing is a risk taking activity since the buyer has imperfect knowledge about the available alternatives within a product class. Perceived risk is the uncertainty that decision makers face when they cannot foresee the consequences of their buying decisions. This definition highlights the two dimensions of perceived risk: the possible negative *consequences* of a choice alternative and the *uncertainty* of their occurrence (Cox 1967; Cunningham 1967). If the perceived risk exceeds a desirable or a tolerable level, it generates a motivation for risk-reducing behavior. The behavioral alternatives may either aim at reducing perceived consequences or perceived uncertainty. With respect to purchase complexity, we focus on the uncertainty reducing strategies

Purchase complexity and buying process

The external information search as a strategy to reduce perceived uncertainty has received much attention in the literature on buying behavior. Many studies have been devoted to the relationship between perceived risk and the amount of information search. Gemünden (1985) raised severe doubts concerning the empirical evidence of this relationship, because in a meta-analysis he found contradictionary results in 51 of the 100 empirical findings. An explanation for the failure of the risk-information-search hypothesis may be that perceived risk remains below a critical threshold of 'tolerated risk'. This explanation is confirmed by another result of the meta-analysis that the support for the risk-information-search hypothesis was positively influenced by the complexity of the decision-problem (Gemünden 1985). Another explanation for the failure of this risk-information-search hypothesis is that buyers use other uncertainty reducing strategies like buying a familiar or well-known brand, or buying from a familiar supplier.

Farmers may search for external information in order to reduce uncertainty. Farmers lack the information relevant for their buying decision, especially regarding products which are purchased infrequently. Where the purchase occurs frequently, the perceived risk may remain below a tolerable level and consequently the external information search may be absent during each separate transaction.

Purchase complexity and buying structure

Besides an external information search, reduction of perceived uncertainty may be realized by more prepurchase consultation with other members of the farm family. The assistance of other family members may be used for external information search and/or to make an accurate choice. The proposed relationship (Sheth 1973) that purchase complexity positively affects joint decision making and the size of the buying center is empirically supported by Johnston and Bonoma (1981a) and Wilson et al. (1991) in the context of industrial buying behavior.

Purchase complexity and vendor loyalty

Buying the same brand and/or buying from a familiar supplier are other strategies to reduce perceived uncertainty (Sheth and Venkatesan 1968; Sweeney et al. 1973; Puto et al. 1985). Given these strategies, purchase complexity is positively related to brand/vendor loyalty. Research on industrial and consumer buying behavior has demonstrated that, in high-risk situations, buyers tend to reduce the uncertainty by choosing well known suppliers and brands (Cunningham 1967; Cardozo and Cagley 1971; Roselius 1971; Newall 1977; Puto et al. 1985). The choice of a well known supplier is also a valuable and efficient strategy for farmers to reduce uncertainty in

high-risk situation, because they can spend only a very limited amount of time on these buying decisions. In addition, vendors are experts on certain inputs and farmers can use this expertise by means of loyal behavior.

Product importance

With respect to buying decisions, product importance is the perceived significance of the buying decision in terms of the size of the purchase and/or the potential impact of the purchase on the functioning of the farm (Bunn 1993). Product importance in purchasing involves three aspects: (i) financial importance (size of investment), (ii) relevance for the end product, and (iii) relevance for the continuation of the production process (Möller and Laaksonen 1986). The first aspect refers to the allocation of scarce resources toward a product. The second aspect reflects the necessity of inputs to produce particular farm products. These two aspects of product importance are relevant for all inputs, although in a different degree. The last aspect is especially important for equipment, services and supplies. These products facilitate the continuation of the production process.

Product importance and perceived risk

Product importance refers to the perceived consequences of a wrong decision. Besides uncertainty, the possible negative consequences of a choice alternative is the other dimension of perceived risk. Strategies for reducing negative consequences of choice alternatives include trial purchases, short-term leasing of equipment, warranties, insurances, buying a lower priced alternative, buying smaller amounts, and using multiple sources or split procurements (Cox 1967; Sheth and Venkatesan 1968; Sweeney et al. 1973; Puto et al. 1985). It is often assumed that activities related to reducing perceived consequences are too costly and/or reduce only a small part of the total risk.

Nevertheless, we expect that the product importance determines the allocation of time over the various buying decisions. A farmer can spend only a limited amount of discretionary time on purchasing. Thus, a farmer has to establish priorities to the various buying decisions in order to have an accurate allocation of time. It is likely that the priorities of the various buying decisions are based on the importance of the product. In a cost-benefit consideration, the expected benefits (avoidance of negative consequences) per cost unit (available time) are higher for more important products.

Product importance and farmers' buying behavior
Since product importance determines the priorities of the various buying decisions, we expect that the buying process and the buying center is more extensive in the case of buying important products. Some empirical evidence for the positive association between product importance and extended buying processes is provided by Jacoby et al. (1978). They found that consumers acquired more information when they bought a more important product. In addition, the price of a product (financial importance) is also a determinant in the external search effort of consumers (for an overview of the relevant literature see Beatty and Smith 1987).
In the context of industrial buying behavior, the positive influence of product importance on joint decision making and the size of the buying center is empirically supported by studies by Johnston and Bonoma (1981a), Moriarty and Spekman (1984) McQuiston (1989), and Wilson et al. (1991).

4.3.3 MARKET CHARACTERISTICS

The behavior of farmers in the input markets is determined by the characteristics of these markets. These characteristics are especially important to explain the relationships of farmers with their suppliers and their brand/vendor loyalty. In this section, our discussion is focused on market structure, market dynamism and market transparency (see figure 4.3b) and their influence on farmers' buying behavior.

Market structure

Market structure refers 'to those attributes of the market that influence the nature of competitive process' (Clarkson and LeRoy Miller 1982, p. 5). Market structure thus includes the number and size distribution of sellers and buyers, barriers and conditions of entry, and physical or subjective product differentiation. These market characteristics are very important for a proper understanding of buyer-seller relationships. Less important is that market structure may also include characteristics like firm cost structures, the degree of government regulation, the degree to which producers of inputs are vertically integrated in distribution and conglomerateness (Clarkson and LeRoy Miller 1982; Scherer and Ross 1990).

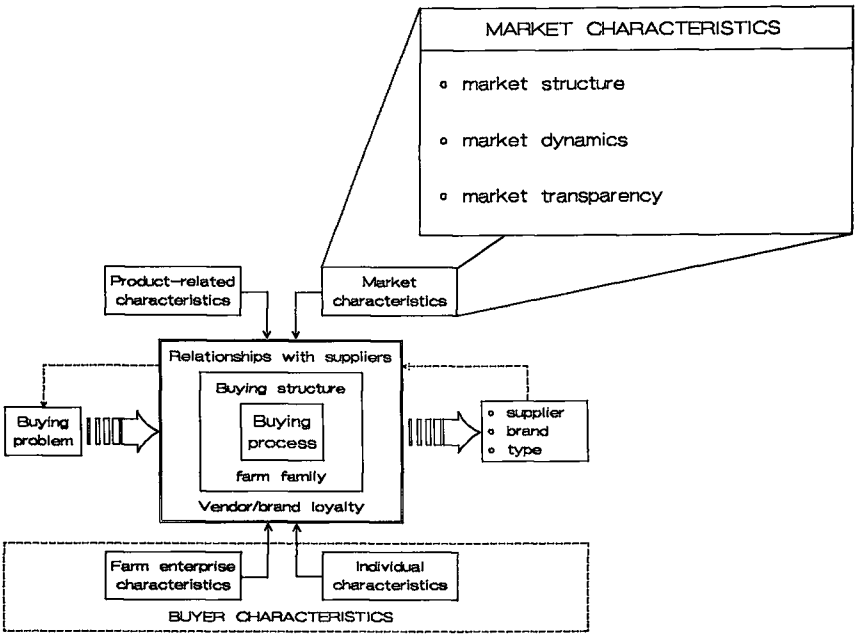

Figure 4.3b *Market characteristics as determinants of farmers' buying behavior*

The position of an individual farmer in the input market depends on the market structure. The demand side of farm input markets exists of many small buyers. The supply side of these markets may range from many to few suppliers. Moreover, the farm input market may be characterized by either homogeneous or differentiated products, and by either low or high entry barriers. We will discuss two typical structures of farm input markets and the farmers' purchase strategy to cope with these structures. These two market structures are two end-points of a continuum which exist in farm input markets.

Market structure 1 goes for a market consisting of many suppliers of nearly equal size, with low entry barriers, and with a homogeneous product. In the face of this market structure, farmers tend to exhibit a competitive purchasing strategy, in which they are taking advantage of market forces with respect to every discrete transaction. Farmers try to keep the switching costs low and consequently their relationships with farm input suppliers are independent. If farmers are loyal to certain vendors or brands in this market structure, it is very likely that this loyalty is based on other reasons than commitment (spurious loyalty).

Market structure 2 goes for a market consisting of a few large suppliers, with high entry barriers, and with a highly differentiated product. In the face of this market structure, farmers tend to exhibit a cooperative purchasing strategy, in which they are willing to establish a stable long-term relationship with a supplier. The risks and costs associated with switching from one supplier to another are high in markets with highly differentiated products and high entry barriers. In this market situation, a farmer may become true vendor loyal (high commitment). Farmers try to lower the switching costs in order to cope with their dependency on suppliers (Campbell and Cunningham 1983).
When farmers become too dependent on farm input suppliers, they overcome their weak market position by cooperative buying through farm purchasing cooperatives. In combining the needs of a group of farmers, purchasing cooperatives can exert significant 'countervailing power' vis-à-vis the powerful supplier (Galbraith 1957). Exertion of countervailing power was an important reason for the origin of farm purchasing cooperatives (Ter Woorst 1966). As a result of the establishment of farm purchasing cooperatives, farmers become less dependent on one supplier since they can choose between at least two alternatives: the farm purchasing cooperatives and the proprietary farm input suppliers.

Market transparency and dynamics

Market transparency depends on the degree and clearness of difference between the suppliers in the market (heterogeneity), while market dynamics refer to how these differences change over time. The degree of market uncertainty depends on these two variables (Håkansson et al. 1977). Market uncertainty can be reduced in the same way as reducing uncertainty caused by purchase complexity. Farmers can search for additional information which makes the market more transparent for them. Moreover, reduction of market uncertainty may be realized by more prepurchase deliberation with other members of the farm family. The responsibility for the failure caused by a wrong decision is shared by more individuals if the buying center is larger. Finally, buying from a familiar supplier is also a strategy to reduce market uncertainty.
Another reaction to market uncertainty is possible. If this uncertainty is caused by a dynamic market, farmers tend to avoid commitment to a particular supplier and buy products from multiple sources, and thus pursue independent relationships. Farmers who rely on one supplier run the risk of losing opportunities in the future. The changes in a dynamic market are difficult to predict. Therefore, farmers must keep switching costs low in order to maintain the possibilities of exploiting future changes

in the market. Thus, when dynamism is large, the opportunity costs are large and consequently there are reasons for caution in developing commitment to one supplier and to close relationships (Håkansson et al. 1977).

4.3.4 FARM ENTERPRISE CHARACTERISTICS

Farmers' buying behavior is constrained by the financial, technological and human resources of the farm. When a farmer starts a farm, choices are made with respect to the output and production method. Long-term investments in education (human capital), land, buildings, and equipment suitable to a certain type of farming determine the financial, technological and human resources of the farm. Buying decisions are made within the constraints of these fixed resources characterizing the farm enterprise.

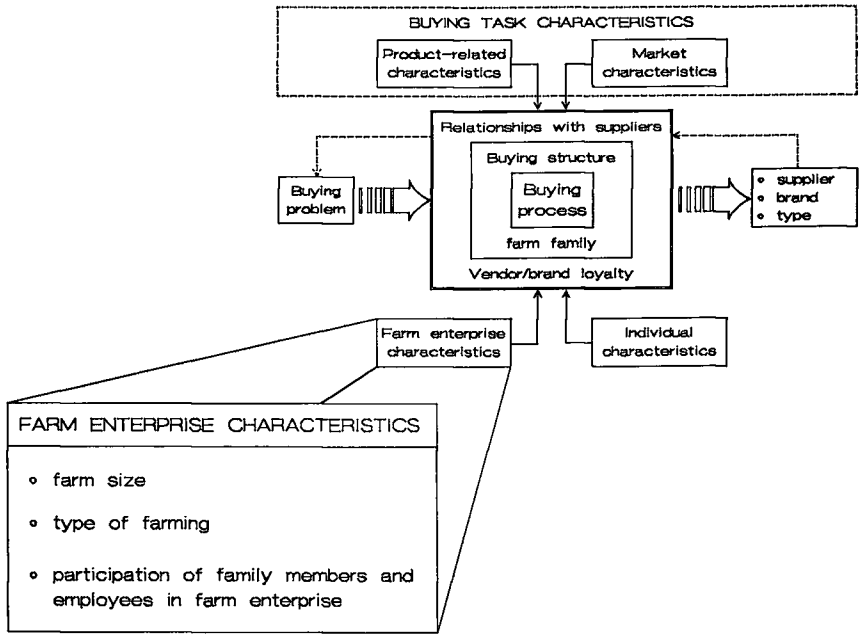

Figure 4.3c *Farm enterprise characteristics as determinants of farmers' buying behavior*

The influence of farm enterprise characteristics on farmers' buying behavior are discussed here. Our discussion is focused on the following farm enterprise charac-

teristics: farm size, type of farming, and participation of farm family members and employees in the farm (see figure 4.3c). These variables are frequently used to segment the farm input market, because these variables are relatively easy to measure and these variables are often available in agricultural statistics.

Farm size

In the literature on buying behavior, the size of the buying organization is an important determinant of the buying structure. That is why we discuss the relationships between farm size and buying structure of farms. We also address the influence of farm size on farmers' relationships with suppliers. No relationships are expected between farm size and farmers' buying process.

Farm size and buying structure

Sheth (1973) suggested that joint decision making occurs more frequently in large companies than in small companies. Empirical evidence for a positive relationship between organizational size and joint decision making and/or the size of the buying center was provided by studies by Grønhaug (1975), Bellizi (1981), Crow and Lindquist (1985), Patton et al. (1986), and Lynn (1987). Only in the study by Johnston and Bonoma (1981a), a statistically significant relationship between buying center size and organizational size was absent.

In the case of farmers, we do not expect that variation in farm size affects autonomous versus joint decision making, nor affects the size of the buying centers as long as the farm production is organized within the context of family farms or in other small production units. Only when farm operations are organized within large organizations which are compartmentalized, i.e. pursue functional specialization, and operate on the basis of prescribed policies and procedures, then purchasing is managed along formalized procurement procedures and buying processes are complex (see section 3.2). The buying centers in these organizations can be very extensive and complex. The buying behavior of these farm enterprises resembles other large industrial organizations. In Western societies, however, almost all farm operations are organized within family farms.

Farm size and farmers' relationships with suppliers

Relatively large farms, in turnover terms, are strategically more important for a farm input supplier than small farms. The former farms purchase larger quantities of materials and they generally possess sophisticated machinery due to substitution of labour by machinery. Large farms are attractive customers to farm input suppliers

for their demand potential. For large farms it is less risky to commit themselves to one supplier than small farms, because the power of the former farmers vis-à-vis the farm input supplier is more equivalent (interdependent relationships). Larger farms can have more than one supplier for reasons of playing one supplier off against another. On the other hand, small farms are forced to commit themselves to one supplier resulting in dependent relationships.

Type of farming

While farm size refers to the economic size of a farm, type of farming is determined by the relative contribution of various types of production to total farm output. Strategic choice with respect to output and production method determines the type of farming. Based on this farm enterprise characteristic, farms can be classified into, for example, arable farms, specialized dairy farms, mixed farms, non-grazing livestock farms.

The type of farming determines the seasonality in work load. For example, arable farming has a strong seasonality in work load, i.e. very high pressures of work during sowing and harvesting and low pressures of work during the winter, while non-grazing livestock farming (pigs and poultry) has an almost constant work load throughout the year. These differences are important in relation to the discretionary time available to make buying decisions. During periods of a very high work load, farmers can only devote a minimum amount of time on purchasing. On the other hand, in a period of low work load, farmers may devote more time on purchasing. During these periods, farmers may purchase durable products, like equipment, and the suppliers of materials may also be reconsidered.

Participation of family members and employees in the farm enterprise

Farms can be characterized by the number of family members and employees who are working in the farm. This characteristic is especially important to explain the buying structures of farms. We expect that variations in the number of family members and/or employees working in the farm influence neither the buying process nor the relationships with suppliers and vendor loyalty.

We expect that joint decision making and size of the buying center are positively influenced by the total number of individuals working in the farm and the number of individuals who use the product. Participation in farm operations and degree of responsibility for specific farm operations may stimulate participation in the buying process.

The distinction between sole proprietorship and partnership is also important to understand buying structures on farms. In case of sole proprietorship, the farmer primarily is responsible for the management of the farm. He is often assisted by his wife and other family members. In case of partnership, the partners are both owners of the farms and responsible for the management of the farm. Since the income of both partners depends on the buying decisions, joint decision making and larger buying centers occur more often in case of partnerships. In fact, the strongest drive to take part in the buying decision-making exists when a person is one of the owners of the farm.

A final point with respect to the participation of family members and employees in the farm enterprise refers to certain attitudes and expectations about the roles of themselves and other individuals in the farm. Studies on household decision making indicate that a relatively strong relationship exists between the (sex) role orientation and the degree of household influence (Ferber and Lee 1974; Rosen and Granbois 1983; Spiro 1983; Quals 1987). Based on these findings, we expect that the influence of a buying center member depends on the position and the associated role of the individual in the farm. Moreover, the position of an individual in the farm enterprise determines the bases of power, i.e. reinforcement power, legitimate power, expert power and/or referent power (see section 4.1.3).

4.3.5 INDIVIDUAL CHARACTERISTICS

Characteristics of individual members of the farm family are important to understand the buying behavior on farms. Only the individual as an individual or a member of a group can define and analyze buying situations, decide, and act. The individual is at the center of each buying process. Individual characteristics can be divided into two kinds: personal characteristics and farmer characteristics (see figure 4.3d).

Personal characteristics describe individuals in general terms, e.g. age, education, personality, life-style. These characteristics are unique for an individual and as such they may be important to explain buying behavior. Personal variables are often used for segmentation purposes (Kotler 1991). A study by Funk and Hudon (1988) presented an application of segmentation based on life-style profiles of farmers. These authors found four segments which differ principally in terms of adoption behavior, opinion leadership, and management capabilities.

The influence of personal characteristics on farmers' buying behavior is similar to the influence of personal characteristics in consumer and industrial buying behaviors.

Hence, we do not devote specific attention to the influence of these characteristics on farmers' buying behavior.

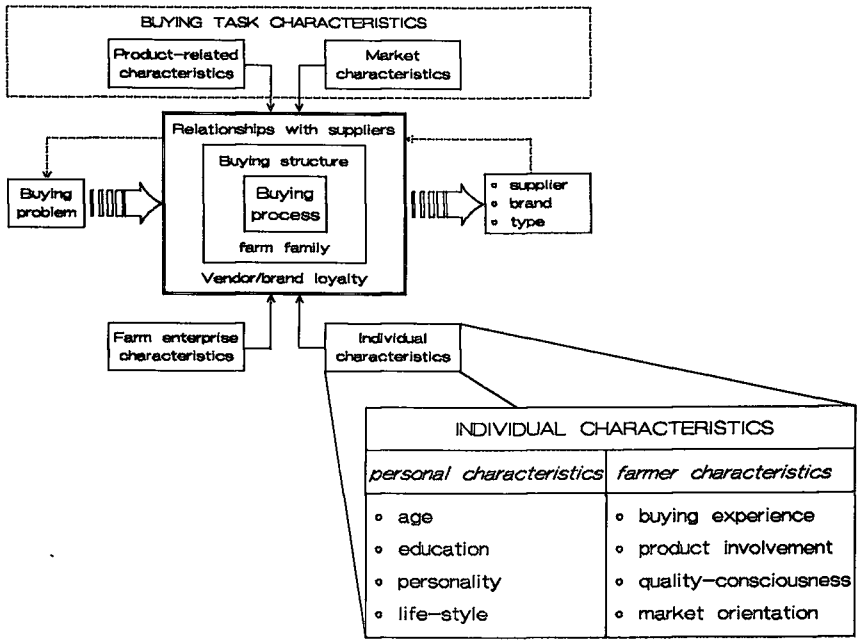

Figure 4.3d *Individual characteristics as determinants of farmers' buying behavior*

Farmer characteristics, like buying experience, product involvement, quality-consciousness, and market orientation, are discussed with regard to their relevance to buying decisions of farmers. Here, we devote our attention to these variables, because of their specific importance to understand farmers' buying behavior.

Buying experience

Buying knowledge

Cognitive psychologists have suggested that there are two basic types of knowledge: procedural and declarative knowledge. *Procedural knowledge* refers to an individual's cognitive representations of how to do things. *Declarative knowledge* involves the subjective facts that are known. These facts may refer to specific events that have occurred in the past or to a generalized knowledge that gives meaning to

one's world (Anderson 1983; Peter and Olson 1993). In line with these two types of knowledge, we distinguish buying knowledge and product knowledge with respect to farmers' buying behavior. *Buying knowledge* refers to the farmers' cognitive representation of how to buy a particular product. Buying experience leads to enhanced buying knowledge including where and when to buy a product. *Product knowledge* refers to farmers' representation of information about the product including awareness of the product category and alternatives within it, product terminology, product attributes or features, and beliefs about the product category and the alternatives within it.

Buying experience and buying process

The influence of buying experience on farmers' buying behavior can be explained on the basis of the psychology of simplification. The psychology of simplification refers to a tendency of decision makers to simplify complex choice situations by a process of learning over time (Howard and Sheth 1969; Bettman 1979). The effects of repetition or practice with cognitive efforts is that performance time decreases without any loss of the quality of performance. As farmers have gained more buying experience regarding a particular input, we expect that they put less effort into the next buying process. They reduce their information search, use fewer sources of information, use the sources less frequently, and evaluate fewer choice alternatives. Thus, buying experience effects that farmers' buying processes move from extensive problem solving (EPS) to limited problem solving (LPS) to routine problem solving (RPS).

The relationship between buying experience and the amount of information search has received considerable attention in the literature. Most studies report a negative relationship (e.g. Newman and Stealin 1972; Moore and Lehmann 1980; Kiel and Layton 1981; Punj and Stealin 1983; Beatty and Smith 1987; Srinivasan and Ratchford 1991). In agreement with the psychology of simplification, these findings indicated that simple repetition leads to a reduction of the cognitive efforts required to perform the task (Alba and Hutchinson 1982).

In case of extreme habitual decision making, like ordering compound feed or fertilizer, farmers may complicate the choice situation by comparing the current supplier with alternative suppliers from time to time, for example once a year. In this manner, the farmer keeps himself informed about the market. This process of complication after a process of simplification was also suggested by Howard and Sheth (1969), where consumers actively search for new alternatives caused by novelty and curiosity behavior.

The influence of buying experience on buying structure and vendor loyalty

As a farmer buys a product more often, his confidence increases accordingly. Consequently, besides a reduction of the problem-solving effort, this results in less need for problem-solving capacity, i.e. more individual decision making and smaller buying centers. Farmers with little buying experience (e.g. first-time buyers) may have less confidence in the outcome of the buying process and may solve the buying problem by relying on others (e.g. other family members). The farmer with more buying experience tries to simplify the decision making by involving fewer persons. Empirical evidence for the relationship between novelty and the type of decision making/size of buying center with respect to industrial buying behavior was discussed in section 4.3.1.

Farmers avoid vendor change when they cannot foresee the consequences of this change. A farmer with little buying experience knows less about the market and other suppliers than a farmer with much buying experience. Consequently, the former farmer is uncertain about the consequences of switching vendors and this makes it more difficult to change to another vendor.

Product involvement

Product involvement versus purchase involvement

Being confronted from time to time with buying problems, every farmer is at least temporarily interested in a product. This short-term product interest results from the drive to find an acceptable solution to the buying problem, or in other words to make an acceptable choice out of the alternatives available in the product class. This type of short-term product interest is expressed by the concept of *purchase involvement* (Mittal and Lee 1989). Purchase involvement is the interest taken in solving the buying problem. The various levels of problem-solving activity (EPS, LPS and RPS) express this type of involvement.

Product involvement is the enduring interest a farmer finds in a product class. This involvement stems from the farmer's perception that the product class meets important values and goals. According to Mittal and Lee (1989, p. 366), these goals can broadly be classified into three groups: (i) utilitarian, i.e. economic, rational, functional goals, (ii) sign-value, i.e. social, self-concept related, or impression management goals, and (iii) hedonic, i.e. sensory pleasure or experiential goals. Product involvement is permanent in character, reflecting a continuing enthusiasm rather than the temporary product interest resulting from purchase requirements (Peter and Olson 1993; Mittal and Lee 1989).

Consistent with the distinction between purchase and product involvement, Bloch et al. (1986) distinguished prepurchase and ongoing search. Prepurchase search refers to information acquisition and processing activities which are engaged in to facilitate buying-decision making. These search activities lead to an enhanced buying knowledge. Ongoing search is the search activities that are independent of specific buying needs or decisions (Bloch et al. 1986). Ongoing search is determined by product involvement.

Product involvement and farmers' buying process

As a result of ongoing search, product knowledge increases. Product knowledge can have a *facilitating effect* on prepurchase search. In general, a farmer requires additional information in order to make the buying decision. Much product knowledge reduces the cognitive costs of prepurchase search. It increases the ability to integrate new information and speeds up the time to make a right or sensible analysis of the problem. When decision makers feel more confident, they typically acquire more information (Duncan and Olshavsky 1982). Farmers with much product knowledge are perceived as experts by their colleagues. Due to their 'status', they perceive higher social risks of making bad decisions. Besides, experts are more likely to know where to find the relevant information and they are more aware of potential problems than non-experts. Therefore, high product involvement and consequently more ongoing search leads to higher levels of problem-solving effort and extended buying processes. This positive relationship between product knowledge and external search is found in many studies on consumer behavior (e.g. Jacoby et al. 1978; Johnson and Russo 1984; Brucks 1985; Mittal and Lee 1989; Selnes and Troye 1989).

Product knowledge gained by ongoing search can also have an *inhibiting effect* on prepurchase search. It can allow the farmer to rely more on internal search during the buying decision-making, thereby lowering the need of prepurchase search. This negative relationship between knowledge and external search is found in a number of studies on consumer behavior (e.g. Moore and Lehmann 1980; Kiel and Layton 1981; Beatty and Smith 1987). These positive and negative influences may combine to produce an inverted-U relationship between knowledge and external search in which first a facilitating effect succeeded by inhibiting one is suggested (Bettman and Park 1980; Urbany et al. 1989). However, the inhibiting effect only occurs at high levels of product knowledge. Such high levels of product knowledge are not expected for farmers, because they do not have time to become specialists regarding a certain farm input. For instance, salesmen of farm inputs attend special courses and seminars in order to increase their product knowledge. However, farmers are

not able to attend these courses and seminars, since they must manage their farms. Since farmers only gain experience by using the product, the product knowledge of farmers refers to only one or a few alternatives within the product class. Hence, we expect that product knowledge of farmers only facilitates the prepurchase search activities.

Quality-consciousness

By using the concept of 'quality-consciousness', Steenkamp (1989) found that in the decision process some consumers give more attention to quality-related aspects than others. Steenkamp (1989, p. 104) defined quality-consciousness as 'a mental predisposition to respond, in a consistent way, to quality-related aspects, which is organized through learning, and influences behavior'. It is defined as a domain-specific concept meaning that a farmer may be quality-conscious with respect to feed but not with respect to fertilizer. Quality-consciousness can be based on past experiences with the product class, and on information acquired from different sources.

Quality-consciousness and farmers' buying behavior

Quality-consciousness is also relevant to farmers' buying behavior, because it affects the relative weight of perceived quality in choice behavior. Much information is needed and many alternatives should be evaluated in order to judge adequately the quality level of the available alternatives. Accordingly, we expect that quality-consciousness is positively related to the level of problem-solving effort.

A shift to another vendor exposes a farmer to the risk that the new vendor does not meet his quality requirements. Since more quality-conscious farmers have higher quality requirements, these farmers perceive higher switching risks than farmers who are less quality conscious. Thus, quality-conscious farmers are encouraged to continue the relationship with the present vendor, if this vendor meets the quality requirements.

Market orientation

The market orientation of a farmer is the mental predisposition to try to create superior value most effectively and efficiently for his targeted customers. In general, market orientation consists of three behavioral components, i.e. customer orientation, competitor orientation, and interfunctional coordination (Narver and Slater 1990). For farmers, customer orientation is the most important component. Competi-

tor orientation is not relevant at individual level, since farmers generally perceive other farmers as colleagues in stead of competitors. Interfunctional coordination is also not under discussion, because farms generally are small-scale businesses without compartmentalization and functional differentiation. Since customer's needs and expectations continually evolve over time, a consistent delivery of superior value requires ongoing tracking and responsiveness to changing market products (Jaworski and Kohli 1993). Thus, market-oriented farmers highly value information about the consumer or other final users of their outputs. These farmers are willing to adapt their farm activities to the changing demands of the output-markets. They are always interested in other ways of production which can improve their output in the interest of their buyers.

Although market orientation is an individual characteristic, it also depends on the environment. It is influenced by the type of output of the farm, like commodity versus consumer products. Farmers can also delegate their marketing function to the processing industry or traders, whether or not cooperatives, and concentrate themselves on production. If this delegation exists, there is another, more limited type of market orientation: processing industry and/or traders translate the requirements of consumers to the farmer. Farmers' market orientation is also influenced by the degree of governmental regulation and protection. Some product markets (e.g. dairy markets) are strongly regulated and protected by Common Agricultural Policy (CAP) and, consequently, there are fewer incentives for market orientation.

Market-oriented farmers keep on trying to improve their output by better inputs. They probably perceive higher benefits of problem-solving activity in purchasing than farmers who are less output-market oriented. Consequently, the buying process of the former farmers is more extended.

4.4 ENVIRONMENTAL INFLUENCES ON FARMERS' BUYING BEHAVIOR

Agriculture as an industry is imbedded in an environment, which may influence farmers' buying behavior. This environment encapsulates the buying task environment of farmers. The influences of the agricultural environment on farmers' buying behavior are subtle and pervasive as well as difficult to identify and to measure. The environment affects farmers' buying behavior by providing information as well as by prescribing constraints and offering opportunities. Based on the theory of industrial

buying behavior by Webster and Wind (1972), six sets of environmental influences may be identified: social, cultural, economical, political/legal, technological, and physical. The inclusion of these six environmental influences completes the farmers' buying behavior model (see figure 4.4). The environmental influences may be exerted through a great variety of institutions operating within the buying environment of the farm enterprise, including business firms (e.g. suppliers and customers), farmers' unions, governmental agencies, trade associations, educational and advisory institutions, and so on. The nature of these institutional forms will vary significantly from one country to another.

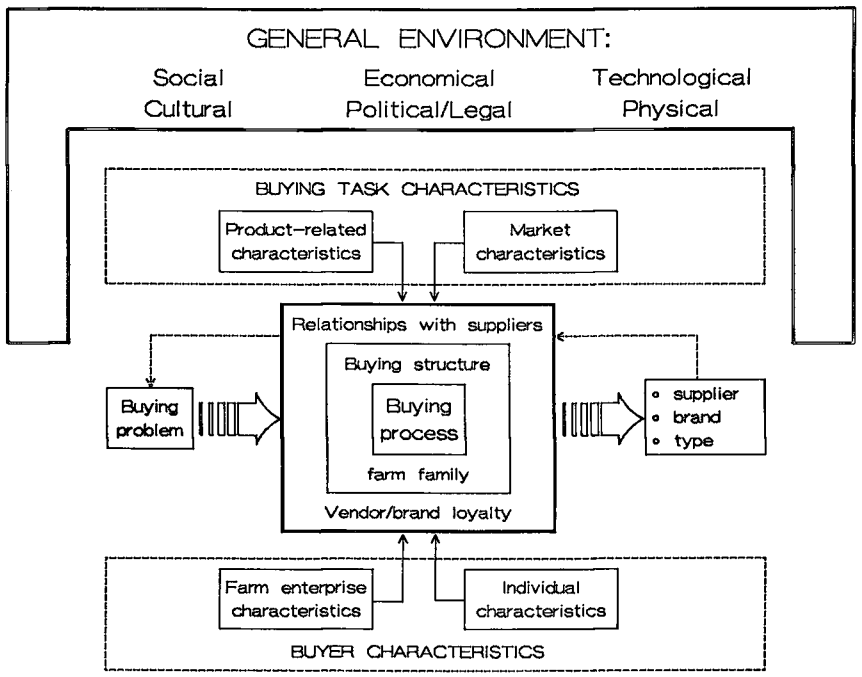

Figure 4.4 *An extended model of farmers' buying behavior*

The six sets of environmental influences are both directly and indirectly relevant to farmers' buying behavior. Environmental factors influence farmers' buying behavior in four distinct ways. *First*, environmental factors determine the availability of goods and services to the farm enterprise. Technological progress has stimulated agricultural production to a considerable extent during this century. Yield per farm has increased dramatically due to a continuous 'technology push', the development of

new breeds, machinery and production methods. Machinery is substituting labour and the use of various inputs, such as chemicals, compound feed and fertilizer, has been intensified. Current technological progress is focused on a reduction of labour need (process-automation) and on the improvement of product quality. Furthermore, farmers have gained access to monetary resources within the framework of agricultural credit, like agricultural credit cooperatives.

Second, environmental factors define the general business conditions within which the farmer must operate, including the legal environment, the political climate, physical constraints, and the availability of monetary resources. Governments exert influence through the creation of a legal environment within which the farmers' buying activities must take place. Political influences include arrangements such as CAP and GATT. Moreover, farmers are confronted with an increasing number of environmental regulations which put constraints on agricultural production and consequently on farmers' buying actions.

Third, the social system also influences farmers' buying behavior. The social system affects farmers' buying behavior primarily by determining the values of farmers, vendors, and other people involved in the buying process. Although it is changing very rapidly, farmers are traditionally part of a close social system in which the members expect cooperative behavior from each other.

Fourth, environmental factors influence farmers' buying behavior through a communication network directed to farmers and other individuals at the farm. This communication network may provide information about the availability of goods, governmental regulations, values and norms, and so on.

4.5 SUMMARY OF THE GENERAL MODEL OF FARMERS' BUYING BEHAVIOR

In this chapter, we have proposed a general model of farmers' buying behavior. Variation in this buying behavior is caused by buying task characteristics (product-related and market characteristics), buyer characteristics (farm enterprise and individual characteristics) and the general environment. We have proposed hypotheses on the relationships between these characteristics and farmers' buying behavior. In this section, a concise and general overview of our model is presented and the elements of this model are addressed to be tested.

A general model of farmers' buying behavior

Buying task characteristics and buyer characteristics directly influence the different dimensions of farmers' buying behavior. Influences of the general environment are more subtle, ubiquitous and difficult to identify. These influences are less critical for a proper understanding of farmers' buying behavior since they become observable only after a long period of changes in farmers' buying behavior and changes in farm input suppliers. The importance of buying task characteristics and buyer characteristics for the different dimensions in the farmers' buying behavior model is summarized in table 4.3. This table is based on the conclusions drawn in the foregoing paragraphs of this chapter.

Table 4.3 *Hypotheses on the importance of buying task characteristics and buyer characteristics in farmers' buying behavior; a summary*

	Buying process	*Buying structure*	*Relationships/ loyalty*
Buying task characteristics:			
Product-related characteristics	***	**	**
Market characteristics	*	*	***
Buyer characteristics:			
Farm enterprise characteristics	*	***	*
Individual characteristics	***	*	*

* = some influence, ** = important influence, *** = very important influence

Farmers' *buying process* is characterized as a problem-solving process. Higher levels of problem solving activity lead to higher perceived costs due to the perceived time spent and the monetary costs of undertaking these buying activities, and the psychological costs of processing information. Farmers' buying process is strongly influenced by product-related characteristics and individual characteristics. Product-related characteristics determine the benefits of both external information search and evaluation of alternatives in terms of possibilities to reduce perceived risk and/or to increase the amount of buying knowledge. Individual characteristics refer to the personal motivation (benefits) to search information and evaluate alternatives.
We expect that market characteristics and/or farm enterprise characteristics have, relatively speaking, less influence on farmers' buying process.

The *buying structure* on farms is rather simple. Buying decisions on family farms are made individually or in small decision making units which are mostly smaller

than three individuals. Thus, the size of buying centers on farms varies within a very limited range. Farm enterprise characteristics strongly influence the number of buying center members. The legal structure, i.e. sole proprietorship versus partnership, is an important determinant of buying structures on farms. Moreover, participation in farm operations and a degree of responsibility for specific farm operations also stimulate participation in the buying process. The influence of buying center members in the buying process depends on the role of the individual in the farm.
Moreover, product characteristics are important influences on buying structures on farms. In case of innovative products and/or high perceived risk, the assistance of other family members may be used for external information search and/or to discuss various choice alternatives. Finally, we expect that market characteristics and individual characteristics have, relatively speaking, less influence on understanding farmers' buying structures.

Farmers' relationships with suppliers and their loyalty to choice alternatives heavily depend on market characteristics. In general, because of their weak market position, farmers try to keep the switching costs low and consequently their relationships with suppliers are quite independent. More interdependent relationships may arise when the farmer exhibits a cooperative purchasing strategy. A dependent relationship results when a supplier exerts dominance over the farmer.
An individual farmer can choose between a competitive or cooperative purchasing strategy depending on market structure, market transparency, and market dynamics. When a farm input market is characterized by many suppliers, homogeneous products and/or low entry barriers, farmers tend to exhibit a competitive purchasing strategy. When a farm input market is characterized by few suppliers, very differentiated products and/or high entry barriers, farmers tend to exhibit a cooperative purchasing strategy. A competitive purchasing strategy is used by farmers in a dynamic market in order to keep the possibilities of exploiting future changes in the market.
Farmers may exhibit a cooperative strategy in order to utilize the contacts with their vendors as advice and expertise. Stable relationships with vendors are especially valuable when farmers buy innovative products and/or products with high levels of perceived risk. In specific situations, farmers' relationships with vendors and their loyalty behavior can be explained by buyer characteristics, like farm size, buying experience, and quality-consciousness.

Elements of the model to be tested

Our model of farmers' buying behavior identifies many key variables and provides a framework for the interaction of these variables. This model, however, is too broad for a comprehensive test. In the context of this study, only the important elements were selected for empirical testing.

Table 4.4 *Overview of the elements of the model to be empirically tested*

Dimensions of farmers' buying behavior	Concrete buying variables
Buying process	• Extensiveness of the buying process • Information sources
Buying structure	• Autonomous versus joint decision making • Size of the buying center • Relative influence of buying center members
Relationships with vendors	• Vendor loyalty

Table 4.4 presents the various elements of the model of farmers' buying behavior to be empirically investigated in the following chapters. These research topics are selectively chosen since they are related to the core elements of our model and because of their relevance to the marketing policies in this field. In order to test the general application of our model, it is tested in different product-market combinations, i.e. for different types of farming as well as for different products (for more details see chapter 5). On the basis of our farmers' buying behavior model, a number of concrete hypotheses on concrete buying variables (see table 4.4) and product-related characteristics, farm enterprise characteristics and individual characteristics are proposed. The discussion and empirical testing of these hypotheses are accounted for in part II of this thesis.

PART II

EMPIRICAL STUDY

CHAPTER FIVE

DATA AND METHODS OF THE EMPIRICAL STUDY

5.1 INTRODUCTION

The previous chapters have addressed the development of a general model of farmers' buying behavior. Based on this model, a number of variables were selected for empirical testing. The chapters 5 to 11 deal with the empirical part of our study of the buying behavior of Dutch farmers. The empirical results are discussed in the chapters 7 to 11: (i) *buying process* in chapters 7 (extensiveness of the buying process) and 8 (information sources); (ii) *buying structure* in chapters 9 (autonomous versus joint decision making and size of the buying center) and 10 (influence of buying center members); (iii) *vendor loyalty* in chapter 11. Each chapter contains a number of hypotheses and the results of the empirical testing.

Data on buying behavior of Dutch farmers were collected by means of a survey. Personal interviews were held with a sample of farmers and greenhouse market gardeners[1]. The farmer was chosen as the key informant about purchasing on his farm. Part of the questionnaire is concerned with the relative influence of the buying center members. Several problems may arise from interviewing one informant about the composition and structure of buying groups (Phillips 1981; Silk and Kalwani 1982). Hence, much attention has been devoted to the evaluation of the key informant method used in measuring the relative influence of buying center members on farms. Chapter 6 reports the results of a separate study on this topic.

This chapter deals with the data and methods of our empirical study. In section 5.2, the research population is defined, and sampling plan and data collection procedures are presented. Moreover, the sample is compared with the population on a number of background variables. Finally, in section 5.3, the operationalization of the variables included in the empirical study are presented and the methods of analysis are briefly discussed.

[1]In this thesis, farmers also include greenhouse market gardeners

5.2 DESIGN OF THE EMPIRICAL STUDY

In the questionnaire, farmers' buying behavior was registered with respect to three buying behavior dimensions, i.e. *buying process* (extensiveness of the buying process and information sources), *buying structure* (type of decision making, size of the buying center, and the relative influence of buying center members), and *vendor loyalty*. The study was conducted in four agricultural sectors: arable farming, dairy farming, pig farming (including pig breeding and hog farming), and greenhouse market gardening (including both vegetables and flowers). In order to explain the observed buying behavior, product-related characteristics, farm enterprise characteristics and individual characteristics of farmers were also recorded.
An overview of the inputs covered in the questionnaire is presented in table 5.1. The choice of the inputs was based on specific considerations. First, each good/service had to be used in at least two types of farming, since we wanted to compare the purchase of the same good/service with regard to two different types of farming. Feeding-computer, climate-computer and hydroponics computer are all interpreted as process-automation systems. Second, since we wanted to compare tangible goods versus services, both types of inputs should be included in the questionnaire. Finally, products should differ with respect to product-related characteristics such as purchase complexity, product importance, and - in case of equipment - stage in the product life cycle, in order to analyze the effect of these characteristics on farmers' buying behavior.

The questionnaire consisted of three parts: (1) a general part with questions about the farm enterprise, the farmer and his family, and product-related characteristics, (2) a part about buying a type of equipment or contracting a financial loan, and (3) a part about buying a type of material (see table 5.1). An overview of the variables operationalized in the empirical study is presented in section 5.3.
The information was collected on the basis of the key informant method (Phillips 1981). This method is a technique to collect information about a social setting by interviewing a selected number of respondents. In industrial buying contexts, mostly one informant provides information about the composition and structure of the buying center, i.e. one informant method (Silk and Kalwani 1982). The evaluation of the one informant method used in measuring the relative influence of buying center members on farms is discussed in chapter 6. The farmer was selected as the informant in this study, beacuse of his position on the farm. In case of partnerships, only one of the farmers was selected.

Table 5.1 *An overview of the goods/services being subjects of the questionnaire*

Types of farming	*Equipment/services*	*Materials*
Arable farming	Tractor Fertilizer-spreader Financial loan (> Dfl 50.000)	Crop protection products Fertilizer
Dairy farming	Tractor Fertilizer-spreader Feeding-computer Financial loan (> Dfl 50.000)	Compound feed Fertilizer
Pig farming (including both pig breeding and hog farming)	Feeding-computer Climate-computer Financial loan (> Dfl 50.000)	Compound feed
Greenhouse market gardening (including both vegetables and flowers)	Climate-computer Hydroponics-computer Financial loan (> Dfl 50.000)	Crop protection products Fertilizer

In cooperation with the Ministry of Agriculture and the Agricultural Economics Research Institute, a random sample was drawn from a database containing all Dutch farmers. The research population was defined on the basis of the following specifications: (1) the farmer is specialized in one type of farming (see table 5.1), (2) the economic size of the farm enterprise is at least 40 NGE (Dutch Size Unit based on a gross margin concept), and (3) the farmer is younger than 65 years. The sampling frame has been derived from the census in 1988. The research population consisted of 40,094 farmers, i.e. 17.5% arable farmers, 53.7% dairy farmers, 10.8% pig farmers, and 18.1% greenhouse market gardeners (Agricultural Census May 1988, CBS 1988). A stratified sample of 2,241 farmers was drawn consisting of the following number of farmers: 578 arable farmers (25.8%), 654 dairy farmers (29.2%), 641 pig farmers (28.6%), and 368 (16.4%) greenhouse market gardeners. As a result of our sampling procedure, all farms of the selected farmers were situated in the geographic center of the various types of farming in the Netherlands. Since information about type of farming and farm size (three categories) of the 2,241 selected farms was provided together with address information, it was possible to compare the sample with the research population. The size distribution is presented in Appendix I, table I.1. The differences between the cumulative distribution functions were examined on the basis of the Kolmogorov-Smirnov test (Siegel 1956). The differences with respect to arable, dairy and pig farming were statistically not significant ($\alpha = 0.05$). There was a statistically significant difference with respect to greenhouse market gardening. Obviously, enterprises in the geographic

centers of greenhouse market gardening in the Netherlands are larger than in the rest of the country. The response rate is presented in table 5.2.

Table 5.2 *Response rate of the survey*

	Arable farming	Dairy farming	Pig farming	Greenhouse market gardening
- Non-response	218 (37.7%)	236 (36.1%)	285 (44.5%)	113 (30.7%)
- Outside target group	114 (19.7%)	64 (9.8%)	157 (24.5%)	87 (23.6%)
- Incomplete/useless interviews	29 (5.0%)	27 (4.1%)	12 (1.9%)	21 (5.7%)
- *Interviewed farmers*	*217 (37.5%)*	*327 (50.0%)*	*187 (29.2%)*	*147 (39.9%)*
Total	578 (100%)	654 (100%)	641 (100%)	368 (100%)

In February and March 1990, the respondents were interviewed about the purchase of two products: (1) one type of equipment or a financial loan and (2) one type of material. The respondents were only interviewed if they had purchased one or more types of equipment included in the survey, or contracted a loan of more than Dfl 50,000 in the three years preceding 1990. A number of farmers were not interviewed because they did not meet this criterion (outside target group, 19%). A significant number of farmers refused participation (non-response, 38%). Almost all refusals concerned the argument of time constraints on the part of the interviewee. Possible other explanations for this non-response level may also be the low output prices and consequently low income (especially arable and pig farming), and a lower willingness due to an increasing number of market research surveys. Finally, 39% of the 2,241 selected farmers were interviewed successfully. An overview of the number of interviewed farmers for the different types of farming and for the different types of input is presented in table 5.3.

In order to examine the non-response, we compared the sample (n_s = 2,241 farmers) with the interviewed farmers (n_i = 879) on size distribution by means of the Kolmogorov-Smirnov test (see Appendix I, table I.2). The differences with respect to type of farming were not statistically significant (α = 0.05). Moreover, we also compared the age distribution of the interviewed farmers (n_i = 879) with the age distribution of the research population (N = 40,094). No significant differences (α = 0.05) were found with respect to all types of farming (see Appendix I, table I.3).

Table 5.3 *An overview of the number of interviewed farmers for the different types of farming and for the different types of input*

Types of input	Type of farming				Total
	Arable farming	Dairy farming	Pig farming	Greenhouse market gardening	
Equipment:					
Tractor	76	96			166
Fertilizer-spreader	57	81			125
Process-automation systems:					
. Climate-computer			74	46	101
. Hydroponics-computer				40	34
. Feeding-computer		65	21		78
					504
Service:					
Financial loan > Dfl 50.000	66	85	92	61	304
Material:					
Compound feed		170	182		352
Fertilizer	83	147		71	301
Crop protection products	96			58	154
					807

5.3 OPERATIONALIZATION OF THE VARIABLES INCLUDED IN THE EMPIRICAL STUDY

This section presents an overview of the variables operationalized in the empirical study. The various variables were measured either by multi-item or by single-item scales. The internal consistency of a multi-item measure was assessed by calculating Cronbach's α. The multi-item scales were refined per item using item-to-total correlations, corrected for the item in question. Nunally (1978) suggested that in the early stages of research on hypothesized measures of a construct, reliabilities of .70 or higher suffice. The dimensionality of the final (reduced) set of items is explored with principal component analysis. The unidimensionality of a scale was assessed by means of a principal component analysis (PCA). The outcome of this analysis should be a one-factor structure accounting for a substantial portion of the total variance, and all items should load on this factor with the theoretically correct sign. These statistics of the multi-item measures are reported in Appendix II.

This section consists of three parts. First, the operationalization of the variables related to the dimensions of farmers' buying behavior is considered. Afterwards, measures of the variables representing the product-related characteristics and the buyer (farm enterprise and individual) characteristics are discussed. Finally, we will briefly discuss the data-analysis procedures.

5.3.1 Operationalization of the variables representing the dimensions of farmers' buying behavior

Buying process

Extensiveness of the buying process (PROCESS)

In chapter four, we argued that the cognitive and behavioral efforts a farmer puts in the buying process may vary from virtually none to very extensive. Differences in problem-solving activity are based on differences in external information search and evaluation of alternatives. At the one extreme, much information is gathered and most choice alternatives are evaluated, i.e. extensive problem-solving (EPS). At the other extreme, there is no information acquisition and other choice alternatives are not evaluated, i.e. routine problem-solving (RPS). The amount of information acquisition and evaluation of alternatives on the part of the farmer in order to purchase a farm input is called *the extensiveness of the buying process*.

The purchase of equipment always involves some degree of information search and evaluation of alternatives. Based on studies by Newman (1977) and Kiel and Layton (1981), six items related to external information search and evaluation of alternatives were used to assess the extensiveness of the buying process regarding equipment and financial loans ($PROCESS_{eq/fi}$): (1) a direct question about the extensiveness of the decision making process, (2) the buying decision time, (3) number of information sources used, (4) number of evaluated suppliers, (5) total number of informational conversations with suppliers, and (6) the number of suppliers in the evoked set. The Cronbach's α value for $PROCESS_{eq/fi}$ was .80 (n = 809) and PCA resulted in one factor with eigenvalue higher than one explaining 50.4% of the total variance (see Appendix II, table II.1).

When buying materials, farmers only order the desired amount of products from the present supplier without evaluating other alternatives. This routine behavior occurs with minimal apparent cognitive effort for every transaction. Potential substitutes to the products purchased are evaluated occasionally, for example once a year. The extensiveness of the buying process regarding materials ($PROCESS_{mat}$) was measured by the frequency of evaluating alternatives.

Information sources

Another important aspect of the buying process is the use of information sources. Farmers may use a great variety of information sources during the buying process. In the questionnaire, the interviewee had to indicate which information source had been used and the relative importance of the used information sources. Four kinds of

information sources were distinguished in the questionnaire on the basis of two dimensions: (i) *source*, i.e. personal versus impersonal and (ii) *type*, i.e. commercial versus noncommercial (see chapter 8)

Buying center

The questionnaire also measured the influence of all family members and employees. The farmer was asked to allocate 100 points among the buying center members according to his perception of each member's relative influence in a specific stage of the decision process. Based on this information, the *type of decision making (TYPEDM)* and the *size of the buying center (SIZEBC)* can be analyzed (see chapter 9). The type of decision making is a dichotomous variable, including individual decision making and joint decision making. A buying decision is classified as individual decision making if there is only one and the same buying center member in all stages of the buying process. Joint decision making occurs when two or more buying center members are involved in one or more stages of the buying process. The size of the buying center is the total number of buying center members involved in one or more stages of the buying process. Finally, *the relative influence of individual buying center members (RELINF)* can be analyzed on the basis of the data provided by the interviewees (see chapter 10).

Vendor loyalty

As argued in section 4.1.4, a distinction should be made between true and spurious vendor loyalty. For this reason, two variables, i.e. *repeat buying behavior* and *commitment to a vendor*, are required to measure vendor loyalty of farmers. These two vendor loyalty dimensions are operationalized in the study as follows:

Repeat buying behaviour (RBB)
Repeat buying behaviour is operationalized as a combination of the number of years that an on-going relationship has lasted (*duration*) and the number of products that a particular dealer has delivered (*intensity*):
RBB = (NUMYEAR/5) * NUMPROD, where
NUMYEAR = duration of the relationships in years (minimum = 0, maximum = 35 for relationships of 35 years or longer);
NUMPROD = number of delivered products, four categories:
1 = the dealer had delivered only the product of the questionnaire;
2 = the dealer had delivered 1-2 other products;

3 = the dealer had delivered 3-4 other products;
4 = the dealer had delivered 5 or more other products.

Degree of commitment (COMMIT)
This variable is measured similarly to the "dollar-metric" measure of brand loyalty, initially proposed by Pessemier (1959). Jacoby and Chestnut (1978) recommended the dollar-metric measure for operationalizing commitment, because of the high test-retest reliability (r = .82, Olson and Jacoby 1971) and because of identical results whether one estimates brand loyalty by either reducing or increasing the price of the target brand relative to alternatives (Jacoby and Kyner 1973).
This study questioned the respondent to indicate the switching price from the present dealer to an unknown dealer both offering the same products and conditions. An unknown dealer had been taken as a reference instead of the second best alternative, because an unknown supplier is an identical point of reference for every farmer.

Type of relationship with the vendor (RELVEN)
As discussed in section 4.1.3, a relationship between the farmer and the vendor may range from a formal or business relationship to a close personal relationship. The study focused on the existence of a personal relationship with a vendor from the farmer's point of view. Personal relationships are mainly constrained by mutual recognition and knowledge of each other as individuals (McCall 1970). The existence of a personal relationship was measured by a five-item scale consisting of: (1) qualification of the relationship (reasonable versus very good), (2) the importance of the relationship, (3) the knowledge of the vendor about the specific farm situation as perceived by the farmer, (4) the attachment to the vendor, and (5) the confidence in the vendor. The verification of the measure was based on 1,662 cases because every interviewed farmer had to rate two suppliers. The Cronbach's α value for *RELVEN* was .71 and PCA resulted in one factor with eigenvalue higher than one explaining 46.2% of the total variance (see Appendix II, table II.2).

5.3.2 Operationalization of the variables explaining farmers' buying behavior[2]

Product-related characteristics

Market penetration (MARKPEN)

Market penetration is an indication of the stage of the product in its product life cycle (PLC). Market penetration is the percentage of potential users, who have adopted the product. The number of farmers using a particular type of equipment is published by the Agricultural Economics Research Institute in an annual statistical overview of the Dutch agriculture (CBS/LEI 1991). Based on these figures, the market penetration of the equipment of the questionnaire with respect to the different types of farming was divided into 5 categories: (1) < 20%, (2) 20-40%, (3) 40-60%, (4) 60-80%, and (5) ≥ 80%.

Purchase complexity (COMP)

Purchase complexity is the perceived lack of being informed prior to buying a product. The operationalization of this construct was based on a review of Möller and Laaksonen (1986). Quite similar measures were developed for assessing purchase complexity of equipment ($COMP_{eq}$) and materials ($COMP_{mat}$) by a five-item and a four-item scale respectively, including: (1) technical complexity of the product (only $COMP_{eq}$), (2) necessity of gathering much information in order to make a buying decision, (3) degree of differences between choice alternatives, (4) number of new technical developments, and (5) the necessity of supplier support in order to use the product. The statistics of these scales are presented in Appendix II, table II.3.

The five-item scale used in assessing purchase complexity of equipment could be verified on the basis of 2,344 cases because every interviewed farmer had to rate at least three products. The Cronbach's α value of this measure was .72 and PCA resulted in one factor with eigenvalue higher than one explaining 47.9% of the total variance. The measurement of $COMP_{eq}$ could be improved by dropping item three, i.e. the degree of differences between choice alternatives. Verification of the resulting four-item scale: Cronbach's α = .72; PCA: one factor with eigenvalue higher than one explaining 54.7% of the total variance.

The four-item scale used in assessing perceived complexity of materials (item 2 to 5) could be verified on the basis of 1,570 cases because every interviewed farmer had

[2]Market characteristics were not operationalized because it would take too many questions to determine the market situation in each combination of a type of farming and a type of input.

to rate two products. The Cronbach's α value of this scale was .65 and PCA resulted in one factor with eigenvalue higher than one explaining 49.0% of the total variance. The measurement of $COMP_{mat}$ could also be improved by dropping item three, i.e. the degree of differences between choice alternatives. Verification of the resulting three-item scale: Cronbach's α = .69; PCA: one factor with eigenvalue higher than one explaining 61.4% of the variance.

Product importance (IMPOR)

Product importance is the perceived significance of the buying decision in terms of the size of the purchase and/or the potential impact of the purchase on the functioning of the farm. The operationalization of this construct was based on Möller and Laaksonen (1986). They discerned three types of importance: financial importance, end-product importance, and production process importance. Since different measures were developed to assess perceived product importance of equipment ($IMPOR_{eq}$) and materials ($IMPOR_{mat}$), these measures will be discussed separately.

The measure for assessing perceived product importance of equipment ($IMPOR_{eq}$) consisted of the following three items: (1) the amount of investment (financial importance), (2) the necessity of possessing a product in relation to the current structure of the farm enterprise (end-product importance), and (3) consequences of a sudden drop-out of the product for the continuation of the production process (production process importance). The measure was verified on the basis of 2,344 cases because every interviewed farmer had to rate at least three products. These items were not related to one construct (the correlation coefficients range from .01 to .24). For this reason, these items are used as separate aspects of importance: $IMPOR1_{eq}$ = financial importance, $IMPOR2_{eq}$ = end-product importance, $IMPOR3_{eq}$ = production process importance.

The measure to assess perceived product importance of materials ($IMPOR_{mat}$) consisted of the following three items: (1) small versus great part of the total costs (financial importance), (2) influence of price fluctuations on total revenues (financial importance), and (3) necessity of the input for the production (end-product importance). According to the verification of $COMP_{mat}$, the verification of the measure was also based on 1,570 cases. The first two items are part of one construct (correlation coefficient .72), and the third item is part of a separate construct (correlation coefficients with item 1 and 2: .16 and .13 respectively). Thus, two aspects of perceived product importance of materials were measured: $IMPOR1_{mat}$ = financial importance (item 1 and 2), $IMPOR2_{mat}$ = end-product importance (item 3).

Farm enterprise characteristics

Type of farming and enterprise economic size (TYPE and SIZE)
An indication as to the farm size and the type of farming was provided together with the address information. In Dutch agricultural statistics, the farm size is expressed in NGE (Dutch Size Unit) which is derived from the European Community typology for farm enterprises. The basis for this typology is the standard gross margin. The size of each selected farm was classified into one of the following categories: (1) 40-70 NGE, (2) 70-100 NGE, and (3) ≥ 100 NGE.
The type of farming is determined by the relative contribution of various types of production practised to the standard gross margin of the farm. The sample of 2,241 farmers only consisted of specialized farmers meaning that the main type of production accounts for more than two-thirds of the gross margin.

Participation of family members and employees in the farm enterprise
Our empirical study expressed the participation of farm family members and employees in the farm business by the following variables:

#FARMER = Number of farmers owning the farm fully or in case of partnerships partially. The number of farmers is more than one in case of partnerships. When a father has a partnership with his son both the father and the son are defined as farmers.

#SPOUSE = Number of spouses working on the farm enterprise. In partnerships between spouses, the man is considered the farmer and the wife is considered the spouse, because these partnerships are generally arranged for fiscal reasons and hardly influence the management of the farm business.

#FAMM = Number of other family members (successor included) working on the farm enterprise

#EMP = Number of employees

SUCC = Presence of a successor, a dichotomous variable (0/1). The successor is one of the children of the farm family.

#TOTIND = Total number of individuals working on the farm enterprise

#TOTIND = #FARMER + #SPOUSE + #FAMM + #EMP

Individual characteristics

Personal characteristics
With respect to all potential buying center members, age (*AGE*), education, and the number of hours per week working on the farm (*WORK*) were measured.

Buying experience (BUYEXP)
This variable was measured by a question about the number of times a farmer has bought a product.

Product involvement (PRODINV)
Product involvement is the enduring interest of a farmer in the product class which leads to information acquisition independent of purchase needs or decisions (ongoing search). We used a variable that referred to the ongoing search behavior of farmers. This variable was measured by two statements: (1) reading many articles about the product, and (2) trying to keep up with new developments. The correlation coefficient is .64 (n = 1,686) indicating that one construct is measured by these two statements.

Quality-consciousness (QUALCON)
On the basis of a measure proposed by Steenkamp (1989), a four-item scale was used to assess the quality-consciousness of a farmer: (1) willingness to pay more for better quality, (2) intention to work only with high quality specimen, (3) the decisiveness of quality in buying decisions, (4) endeavour to purchase only the best quality. The statistics of this scale are presented in Appendix II, table II.4. The measure was verified on the based of 1,686 cases because every interviewed farmer had to express his quality-consciousness with respect to equipment or financial loan and materials. The Cronbach's α value for *QUALCON* was .76 and PCA resulted in one factor with eigenvalue higher than one explaining 58.6% of the total variance.

Market orientation (MARKOR)
In order to assess the market orientation of farmers, a multi-item measure was developed. Eight items were selected from a large pool of items based on group discussions and individual in-depth interviews, together with the results of a small preliminary study. The Cronbach's α value for this eight-item scale in a convenience sample of 132 farmers was .75 and the PCA resulted in one factor with eigenvalue higher than one explaining 37.1% of the total variance. The eight items tap multiple facets of market orientation, including the value of information about the consumer

or final user, the willingness to adapt the farm activities to the changes of the output-market, and interest for other ways of production.
The eight-item scale had a Cronbach's α of .64 (n = 879) and PCA resulted in two factors with an eigenvalue exceeding one. A six-item scale yielded better results, Cronbach's α being .66 and PCA resulted in one factor with an eigenvalue exceeding one (37.6% of the total variance). This six-item scale was used in this study (see Appendix II, table II.5).

5.3.3 Methods of analysis

The variables representing the dimensions of farmers' buying behavior were the dependent variables in the analyses. The choice of statistical technique to test the hypothesized relationships depended on the type of scale used in quantifying the dependent variables. If the dependent variable was expressed in a metric scale, like extensiveness of the buying process and size of the buying center, *regression analysis* was used. In case of a dependent variable which was measured by a dichotomous nominal scale (joint versus autonomous decision making), *logistic regression* was used. Finally, vendor loyalty of farmers is based on two dimensions. The existence of the various types of vendor loyalty was determined by *cluster analysis* and the hypotheses were tested by *multiple discriminant analysis*.
A detailed discussion of the research procedures is provided together with the analysis of the hypotheses in the chapters 7 to 11.

CHAPTER SIX

MEASURING THE RELATIVE INFLUENCE OF BUYING CENTER MEMBERS[1]

6.1 INTRODUCTION

Part of the questionnaire in our empirical study refers to the relative influence of buying center members during the buying process. We have used the key informant method in which one informant of the farm provides the information about the decision making process for the whole buying center (Phillips 1981). However, is it possible to measure the relative influence of (potential) buying center members with one informant and self-report measures? Besides, how refined should the measure be in order to get a full insight in the influence of buying center members during the buying process?
Similar problems arise by studying industrial and family buying behavior. There is, however, no general agreement about the number of informants (single versus multiple informants), the use of self-report measures, and the refinement of these measures for assessing multiperson influence. On the one hand, research on industrial buying behavior pays little attention to the systematic evaluation of methods for measuring the influence of buying center members (Silk and Kalwani 1982). On the other hand, family buying behavior research has been strongly concentrated on the relative influence of husbands and wives in buying decisions (Mayer and Boor 1988). Therefore, the analysis of the validity of measures of multi-person influence is to a large extent concerned with the husband-wife influence (Davis 1971; Wilkes 1975; Sosanie and Tenenbein 1979).

A separate study was set up in order to evaluate the use of the key informant method, the use of self-report measures, and the refinement of these measures for assessing multiperson influence within farms. This study concerned the following aspects:

[1]An earlier version of this chapter was presented at the EMAC conference 1990 (Kool 1990)

1. Is there agreement between the informants on the relative influence of the buying center members (the between-informant agreement)?
2. Does the perceived relative influence of buying center members differ in the various stages of the decision process?
3. Is there a kind of self-aggrandizement bias?

First, the literature on the measurements of multiperson influence in industrial and family buying behaviors will be briefly reviewed. Second, the methodology employed to account for the three research questions will be discussed. The between-informant agreement is analyzed by calculating the correlation coefficients between the informants reports and the Cohen's kappa coefficient (Cohen 1960). Third, a multitrait-multimethod (MTMM) matrix will be designed where n traits (i.e. the influence of a person in different stages of the buying process) are measured by m methods (i.e. informants). This MTMM matrix offers the opportunity to evaluate the extent of agreement between different attempts to measure the same concepts (convergent validity) and to determine the required refinement of the measure (discriminant validity). The MTMM matrix is analyzed by both the Campbell-Fiske (1959) procedure and a procedure based on the confirmatory factor analysis proposed by Widaman (1985). Finally, self-aggrandizement bias is analyzed by testing the significance of the difference between the influence that an informant attributes to himself and the influence that is attributed to him by the other informant.

6.2 A BRIEF REVIEW OF THE MEASURES OF MULTIPERSON INFLUENCE

Measures of multiperson influence are used in surveys of both industrial and family buying behavior. To the author's knowledge, only a few articles deal with systematic evaluations of methods for measuring multiperson influence. These articles are briefly reviewed in this paragraph.

Silk and Kalwani (1982) reported findings bearing on the reliability of measures used in industrial marketing research to identify the structure of buying centers. The most important conclusions of their review of the literature were:

1. Respondents tend to attribute more participation and influence to themselves and/or the positions they hold than other informants attribute to them and/or these same positions (the self-aggrandizement bias).

2. Between-informant agreement about participation is relatively high when measurements pertain to specific stages in the purchase decision process.
3. Agreement on influence, whether self-informant or between informant, is low for global measures involving judgments in the form of rankings or ratings.

Silk and Kalwani concluded that "the reliability and validity of methods currently used to measure the influence of different participants in organizational decisions have yet to be established" (Silk and Kalwani 1982, p. 179). In view of this conclusion, it is remarkable that many analyses of the composition and the structure of buying centers reported after 1982 are still based on the answers of one informant per organization and without a convincing justification of the chosen method (e.g. Bellizzi and McVey 1983; Naumann et al.1984; Crow and Lindquist 1985; Lynn 1985; McWilliams et al. 1992). Thomas (1989) reported the results of a comparative study on a causal versus attributional measurement of interpersonal purchase influence in organizations. He implemented two operationalizations of interpersonal influence in a field study and compared the substantive results. The findings highlighted the sensitivity of research results to measurement approaches. The self-aggrandizement bias might be an explanation for the differences in results.

The examination of the reliability and validity of the measures of multipersonal influence in family buying behavior has been concentrated on husband versus wife dominance (Davis 1971, Szybillo et al. 1979, Wilkes 1975). Davis (1971) applied the multitrait-multimethod (MTMM) approach proposed by Campbell and Fisk to compare four measures of husband-wife influence (two global and two more refined measures). He concluded that refined measures of influence are preferable to global measures (Davis 1971).

Wilkes (1975) also analyzed four measures of husband-wife influence: three global measures consisting of one general question referring to the final outcome and one refined measure consisting of questions about specific stages of the buying process. The refined measure outperformed the global measures of husband-wife influence. In addition, Wilkes applied the MTMM approach to analyze the husband-wife's perceptions about their relative influence during the decision process. This analysis demonstrated that the perception about the relative influence of the spouses differed in every stage of the decision process (Wilkes 1975). In a comparison of three scales for measuring family member influence in household decision making, Szybillo et al. (1979) found the five-point scale and the constant sum scale highly similar. Finally, Foxman et al. (1989) concluded, on the basis of a MTMM-analysis, that family members disagree on the amount of influence adolescents have in family processes. Both parents' perceptions regarding the child's influence were more in

agreement than either of their perceptions were with the child's own perception of his/her influence. Both parents rated their adolescent child as having less influence in family purchase processes than the child rated him/herself as having.

6.3 METHODOLOGY

Measures

The literature review indicates that the refined measures consisting of questions about specific stages of the buying process outperform global measures consisting of one general question referring to the final outcome. Therefore, a refined measure only has been used in this study. Based on some preliminary interviews with farmers, a buying process consisting of five stages was proposed: problem recognition, information search, evaluation of alternatives, final decision, and execution of purchase. The influence of a buying center was measured by a five-point scale and a 100-point constant sum scale. Since the 100-point constant sum scale was a more reliable and valid scale than the five-points scale (Kool 1990), results regarding the former scale only are reported. With respect to this scale, the informants were asked to allocate 100 points among the buying center members according to informants' perception of each member's relative influence in a specific stage of the decision process.

Sampling and data collection procedures

The chosen instrument for measuring multiperson influence was applied to a complex buying decision. The informants of a farm were interviewed on how they had bought a process-automation system. These systems are computer systems for controlling part of the production process (e.g. climate-computers). These computer systems were taken as example since: (1) these systems are a technical innovation in farming (almost every interviewed farmer had purchased this product for the first time), (2) the farmers' involvement with this type of product is high and, (3) the buying process was assumed to be relatively extended (EPS). An extended buying process was needed to determine the refinement of the measure.

Originally, a convenience sample of 100 farms was composed. Personal interviews were conducted with two members of each farm, one with the farmer and the other with his spouse in case of sole proprietorship or with the other partner in case of partnerships. Preliminary research had indicated that these persons were involved in the buying decisions regarding the process-automation system. The second informant of 36 farm enterprises would or could not cooperate and on 15 of the remaining

farms the buying decision was made individually. The analyses were restricted to 49 farms (98 informants), where two or more persons were involved in the buying decision. Hence, the total number of observations exceeded 98 regarding most stages: stage 1 (problem recognition) n = 98; stage 2 (information search) n = 102; stage 3 (evaluation of alternatives) n = 100; stage 4 (final decision) n = 105; stage 5 (execution of purchase) n = 105.

6.4 ANALYSIS OF THE BETWEEN-INFORMANT AGREEMENT

One way to evaluate the between-informant agreement is the calculation of the correlation coefficient between the informants' judgement regarding the specific stages of the buying process. These correlation coefficients ranged from .72 in stage 2 to .84 in stage 5. Complete information about the correlation coefficients of each stage is presented in section 6.5. All correlation coefficients differed significantly from zero ($p < 0.01$). This result indicates a high between-informant agreement.
The between-informant agreement is more closely examined by the kappa coefficient as adapted by Silk and Kalwani (1982). Cohen (1960) introduced this coefficient of agreement for nominal scales. The kappa coefficient (κ) is defined as:

$$\kappa = \frac{P_o - P_c}{1 - P_c}$$

P_o = observed proportion of subjects for which judges agree
P_c = expected proportion of agreement based solely on chance.

This coefficient reflects the excess of observed over chance agreement, normalized by the maximum possible value of this difference. The coefficient is zero when the observed agreement is just equal to that expected by chance and unity when all observed judges agree. Negative values of the coefficient indicate less observed agreement than expected by chance. Note that this coefficient is a measure of agreement in the sense that it depends only on the frequency of *identical* ratings rather than an indication of association.
For a large number of judgement pairs, we can use the normal approximation to test whether the agreement level is greater than zero. The test statistic would be (Chaffin 1989):

$$Z_0 = \frac{\kappa}{\sigma(\kappa)} = \frac{\kappa}{\sqrt{P_c / n (1 - P_c)}}$$

, where $\sigma(\kappa)$ is the estimated standard error for κ based on the null hypothesis that the obtained agreement is equal to chance agreement.

An example of calculating the kappa coefficient and further information about this coefficient can be found in Chaffin (1989) and Silk and Kalwani (1982). The

relevant statistics are presented in table 6.1 evaluating the hypothesis that the observed between informant agreement is higher than the chance agreement.

Table 6.1 *The relevant statistics for evaluating the between-informant agreement with the kappa coefficient*

	N_t	N_i	P_o	P_c	κ	Z_0	p
Stage 1	98	42	.43	.10	.36	10.60	< .01
Stage 2	102	30	.29	.09	.22	6.97	< .01
Stage 3	100	31	.31	.12	.23	6.28	< .01
Stage 4	105	48	.46	.16	.36	8.55	< .01
Stage 5	105	53	.50	.17	.41	9.28	< .01

N_t = total number of subjects
N_i = number of subjects with identical informants' reports
P_o = observed proportion of subjects on which the judges agree, which is N_i/N_t
P_c = expected proportion of agreement based solely on chance

Table 6.1 shows that the observed between-informant agreement exceeded the chance agreement in each stage of the buying process. Thus, we can draw the conclusion that the relative influence of buying center members within the farm can be determined by one key-informant.

6.5 MULTITRAIT-MULTIMETHOD ANALYSIS

Following Wilkes (1975), the multitrait-multimethod (MTMM) approach can be used to analyze the difference in the informants' perceptions about the relative influence of the buying center members in the various stages of the decision process. The MTMM matrix allows the researcher to decompose the total variance into three components: trait variance (variance of the theoretical phenomenon of interest), method variance, and random error. We designed a multistage-multi-informant (MSMI) matrix in which the different stages are the traits, and where the reports of the informants are the methods. By using the MSMI matrix, *convergent* and *discriminant validity* can be assessed as two aspects of construct validity (Campbell and Fiske 1959; Phillips 1981; Widaman 1985). Construct validity can be defined as the extent to which an operationalization measures the construct it is supposed to measure (Peter 1981). Convergent validity refers to the degree to which two attempts to measure the relative influence of a buying center member in a particular stage of the buying process by two different informants are in agreement. If convergent validity is achieved, it is appropriate to test discriminant validity. The

discriminant validity tests whether the relative influence of a buying center member in a particular stage of the buying process differs from the relative influence in other stages when measured by two informants. The evaluation of convergent and discriminant analyses by means of the MSMI matrix is achieved by both the Campbell-Fiske (1959) procedure and a procedure based on the confirmatory factor analysis proposed by Widaman (1985). The results of both procedures are separately discussed in this section.

Table 6.2 presents the MSMI matrix of correlation coefficients (Pearson product moment) among the 10 separate influence ratings (2 informants × 5 stages). This table contains three different kinds of coefficients: (1) monostage-heteroinformant or *validity* coefficients (underlined), (2) heterostage-heteroinformant (*hshi*-) coefficients (enclosed in parentheses), and (3) heterostage-monoinformant (*hsmi*-) coefficients (enclose in square brackets).

Table 6.2 *Multistage-multi-informant matrix*

		Informant 1:					Informant 2:				
	Stages	1	2	3	4	5	1	2	3	4	5
	1										
	2	[.58]									
Inform. 1:	3	[.47]	[.73]								
	4	[.45]	[.72]	[.77]							
	5	[.46]	[.69]	[.71]	[.74]						
	1	.80	(.62)	(.51)	(.42)	(.50)					
	2	(.45)	.72	(.76)	(.68)	(.66)	[.51]				
Inform. 2:	3	(.48)	(.70)	.80	(.65)	(.68)	[.56]	[.86]			
	4	(.49)	(.68)	(.78)	.82	(.74)	[.50]	[.71]	[.79]		
	5	(.55)	(.77)	(.70)	(.62)	.84	[.61]	[.71]	[.72]	[.70]	

6.5.1 The Campbell and Fiske (1959) procedure

Campbell and Fiske (1959) suggested several comparisons of correlations in a MTMM matrix in order to demonstrate the degree of convergent and discriminant validity of the measured variables. Convergent validity is achieved when the validity coefficients are significantly different from zero and sufficiently large. In table 6.2, these underlined coefficients are very large and are significantly different from zero ($p < .01$). This finding suggests that the two informants of the same farm held very common perceptions about the relative influence of buying center members in a particular stage of the buying process when this influence was measured by a 100-points constant-sum scale.

The assessment of discriminant validity is achieved by three comparisons or criteria. The *first* comparison is that the validity coefficients should be higher than the hshi-coefficients. If the various stages can be discriminated regarding the influence of the buying center members, at least the relationship between the two informants' responses in different stages (hshi-coefficients) should be relatively low. Four of the five stages satisfy this discriminant validity criterion. Only for stage 2, two of the eight hshi-coefficients are higher than the validity coefficient.
The *second* criterion of discriminant validity is that the validity coefficients should be higher than the hsmi-coefficients. This comparison suggests that the correlation between the two informants' responses to the perceived influence in the same stage must be higher than the correlations between the perceived influence in two different stages responded by the same informant. Failure to satisfy this criterion could indicate the existence of shared methods variance or reflect interrelatedness of the stages. As a consequence of a high hsmi-coefficient between the stages 2 and 3 of informant 2, this criterion is not satisfied. A comparison without this hsmi-coefficient results in a satisfaction of this criterion regarding four of the five stages. Only stage 2 does not satisfy the criterion then: six of the remaining 19 hsmi-coefficients are higher than or equal to the validity coefficient.
The *third* criterion of discriminant validity is that the pattern of coefficients should be the same in all matrices formed by the hshi-coefficients and hsmi-coefficients. This criterion is a check on the significance of the stages when compared to the methods. In order to determine the degree of association between the rankings, a coefficient of concordance (W) was computed. The data satisfy this criterion: $W = .80$, $\chi^2(9) = 28.91$, $p < .01$. The pattern of relationships regarding the perceived relative influence of a buying center member in different stages is not affected by the informant.

Two of the three requirements of discriminant validity are satisfied by the data for four stages of the buying process. The second requirement is partially satisfied for these stages. Only with respect to stage 2, the perceived relative influence of buying center members does not differ clearly from other stages of the buying process. This stage is highly interrelated with stage 3. Apparently, the informants hardly perceive differences between the relative influence among the buying center members in the stages 2 and 3. An explanation for this result might be that (1) the relative influence does not change from stage 2 to 3, or (2) the stages of information search and the evaluation of alternatives coincide during the buying process. This result suggests that the relative influence of buying center members is different in four stages (activities) of the buying process. To verify this statement, the three criteria of

discriminant validity are again analyzed with a combination of the stages 2 and 3. These two stages are combined by calculating the mean of the perceived influence score. The MSMI matrix with the combined stage 2/3 is presented in table 6.3.
In table 6.3 the different kinds of coefficients are presented in the same way as in table 6.2. It is remarkable that the validity coefficient (underlined coefficients) of the combined stage 2/3 is higher than the seperate validity coefficients. This indicates a higher agreement of the informants' perceptions on the relative influence of the buying center members with respect to the combined stage 2/3 than to the separated stages.

Table 6.3 *Multistage-multi-informant matrix*

		Informant 1:				Informant 2:			
	Stages	1	2/3	4	5	1	2/3	4	5
	1								
Inform. 1:	2/3	[.58]							
	4	[.47]	[.80]						
	5	[.46]	[.75]	[.74]					
	1	.80	(.61)	(.42)	(.50)				
Inform. 2:	2/3	(.48)	.82	(.69)	(.68)	[.55]			
	4	(.49)	(.78)	.82	(.74)	[.50]	[.76]		
	5	(.55)	(.79)	(.62)	.84	[.61]	[.74]	[.70]	

The coefficients in the MSMI matrix presented in table 6.3 satisfy all three criteria of the discriminant validity. First, all validity coefficients exceed the hshi-coefficients (enclosed in parentheses). Second, the validity coefficients of every stage exceed the hsmi-coefficients (enclosed in square brackets). Only the validity coefficient of stage 1 equals the hsmi-coefficient 4-2/3 of informant 1. Finally, the patterns of the coefficients in all matrices formed by the two types of heterostage coefficients are similar across the four triangles ($W = .82$, $\chi^2(5) = 16.43$, $p < .01$). These findings suggest that in extended buying decisions, a complete image of the relative influence of the buying center members can be made on the basis of questions related to four stages (activities) of the buying process: problem recognition, information search/evaluation of alternatives, final decision and execution of the purchase. The relative influence of the buying center members may differ in these four stages of the decision process.

6.5.2 Confirmatory factor analysis for MSMI matrix

Although the comparison procedure proposed by Campbell and Fiske (1959) is rather straightforward to follow, it has a number of shortcomings (see e.g. Peter 1981; Widaman 1985). First, no precise standards and significance tests are provided to ascertain when any particular criterion is met. Instead, only a number of comparisons are offered resulting in a qualitative assessment of convergent and discriminant validity. Second, it is not possible to assess a precise estimation of trait-related and method-related variance for each measure. These and other problems restrict the usefulness of Campbell and Fiske's procedure to assess the construct validity. We will now turn to a procedure based on confirmatory factor analysis as proposed by Widaman (1985) that can overcome these problems.

Assuming that t traits are assessed under each of m methods, the correlation matrix Σ of the mt observed variables (see table 6.2) may be expressed, in the standard factor analytic decomposition of r factors, as:

(1) $\Sigma = \Lambda \Phi \Lambda' + \Psi$,

where Λ is an $mt \times r$ matrix of factor loadings,

Φ is an $r \times r$ matrix of correlations among factors, and

Ψ is an $mt \times mt$ diagonal matrix of unique variances.

If the t trait measures are rearranged within methods, the factor analytic decomposition of Σ represented by equation 1 may be more easily adapted to fitting MTMM data if Λ is partitioned in the following way:

(2) $\Lambda = [\, \Lambda_T \mid \Lambda_M \,]$,

where Λ_T is an $mt \times t$ submatrix of Λ that contains loadings of observed variables on the t trait factors, and

Λ_M is an $mt \times m$ submatrix of Λ that contains method factor loadings.

It is also useful to partition Φ as

$$\Phi = \begin{bmatrix} \Phi_{TT} & \Phi_{TM} \\ \Phi_{MT} & \Phi_{MM} \end{bmatrix}$$

where Φ_{TT} is a $t \times t$ symmetric submatrix of Φ that contains trait factor intercorrelations,

Φ_{MM} is a $m \times m$ symmetric submatrix of Φ that contains method factor intercorrelations, and

Φ_{MT} $(= \Phi'_{TM})$ is a $m \times t$ rectangular submatrix of Φ that contains correlations of the m method factors with the t trait factors.

In general, orthogonality of the trait and method factor spaces is assumed constraining Φ_{MT} and Φ_{TM} to be a null matrix (Widaman 1985). This assumption is also adopted in this study. Application of the CFA model to MTMM data permits one to partition variance into trait, method, and random variance. These reside, respectively, in the squared factor loadings for Λ_T and Λ_M , and in Ψ.

According to Widaman (1985), four CFA models can be specified and compared to yield meaningful tests of hypotheses:

Model 1: The model hypothesizing that variation in measures is explained only by random error (*the null method*). Estimate parameters in Ψ, leaving Λ_T and Λ_M as null matrices, and $\Phi_{TT} = I_t$ and $\Phi_{MM} = I_m$

Model 2: The model hypothesizing that variation in measures is explained completely by traits plus random error (*the trait-only model*). Estimate parameters in Λ_T , Φ_{TT} , and Ψ, leaving Λ_M as null matrix, and $\Phi_{MM} = I_m$.

Model 3: The model hypothesizing that variation in measures is explained completely by methods plus random error (*the method-only model*). Estimate parameters in Λ_M , Φ_{MM} , and Ψ, leaving Λ_T as null matrix, and $\Phi_{TT} = I_t$.

Model 4: The model hypothesizing that variation in measures is explained completely by traits, methods, and random error (*the trait-method model*). Estimate parameters in Λ_T , Φ_{TT} , Λ_M , Φ_{MM} , and Ψ.

Model 4 implies that both trait and method factors are needed to explain the variance in the measures. This model estimates all parameters of the equations 1 and 2. Models 1 to 3 are special cases formed by constraining certain parameters of model 4. Thus, models 1 to 4 is an alternate series of nested models. The null model is nested in both the method-only and trait-only model, whereas the method-only and trait-only models are nested in the trait-method model. A chi-square difference tests can be used to test whether trait, method, or trait-method variance differs significantly from random error. Specifically, a test of trait variance is provided by comparing chi-square tests between the models 1 and 2 and between the models 3 and 4. Similarly, a test of method variance is provided by comparing models 1 and 3, as well as models 2 and 4. In addition to the chi-square tests, two measures of practical fit of covariance structure proposed by Bentler and Bonnett (1980), termed rho and delta, can be calculated:

$$\rho = \frac{(\chi^2_n / df_n) - (\chi^2_s / df_s)}{(\chi^2_n / df_n) - 1} \quad \text{and} \quad \delta = \frac{(\chi^2_n - \chi^2_s)}{\chi^2_n},$$

where χ^2_n is the chi-square associated with the null model,
df_n is the degrees of freedom for the null model,
χ^2_s is the chi-square associated with a substantive model under consideration,
df_s is the degrees of freedom for the substantive model.
Bentler and Bonnett (1980) stated that rho and/or delta should attain values of .90 or above for a model to be accepted.

CFA models are applied to analyze the MSMI matrix of table 6.2. Table 6.4 presents the results of the nested CFA tests for traits and method effects for the MSMI matrix. The first thing to notice is that the trait-method model could not be estimated due to empirical underidentification (Rindskopf 1984). CFA models can only be estimated under the condition that certain parameters, such as factor correlations, do not equal one. As will be discussed below, some factor correlations were very close to one and caused identification problems (Rindskopf 1984).

Table 6.4 *Summary of the nested confirmatory factor analysis tests for trait and method effects*

Models	*χ^2 test*	*p*	*rho (ρ)*	*delta (δ)*
Model 1: Null	$\chi^2(45) = 1020.70$	< .01	—	—
Model 2: Trait-only	$\chi^2(25) = 86.25$	< .01	.89	.92
Model 3: Method-only	$\chi^2(34) = 200.50$	< .01	.77	.80
Model 4: Trait-method	Estimation problems due to empirical underidentification			
Model comparisons				
Trait-only vs. Null	$\Delta\chi^2(20) = 934.45$	< .01		
Method-only vs. Null	$\Delta\chi^2(11) = 820.20$	< .01		

The introduction of either trait or method factors significantly drops the chi-square value indicating that meaningful improvements over the null model are achieved (see ρ and δ of the trait-only and method-only models and chi-square differences). The magnitude of ρ, δ, and the chi-square difference tests suggest that the trait-only method explains more variance than method-only model.

Convergent validity

Since the trait-method model could not be estimated, the test of convergent validity only involved the comparison of the trait-only model and null model. This comparison revealed that the trait-only model results in a significantly better statistical fit to the data (see ρ and δ). This finding suggests that the traits explain a significant and important part of the total variance of the observed variables. On the basis of

the trait-only model, the variance explained by trait factors ranges from 68.0% to 88.9% of the total variance.

Discriminant validity

Discriminant validity is achieved when the trait factor correlation in Φ_{TT} are significantly lower than 1.00. Using CFA, one may test the hypothesis on discriminant validity by taking the difference in chi-square values between the trait-only model leaving the off-diagonals of Φ_{TT} free (oblique) and the model constraining the off-diagonals of Φ_{TT} which relate the trait factors to be unity (1 general trait). Tests for individual Φ parameters may also be conducted by this approach, especially if one of the trait intercorrelations is particularly high. Results of the various models are presented in table 6.5.

Table 6.5 *Summary of the nested confirmatory factor analysis tests for trait-only models.*

Trait-only models	χ^2 *test*	*p*	*rho (ρ)*	*delta (δ)*
Oblique trait factors	$\chi^2(25) = 86.25$	< .01	.89	.92
1 general trait factor	$\chi^2(35) = 202.00$	< .01	.78	.80
Only $\Phi_{32} = 1$	$\chi^2(26) = 86.47$	< .01	.89	.92
Only Φ_{32} and $\Phi_{43} = 1$	$\chi^2(27) = 96.24$	< .01	.88	.91
Model comparisons				
Oblique vs. 1 general trait	$\Delta\chi^2(10) = 115.75$	< .01		
Oblique vs. only $\Phi_{32} = 1$	$\Delta\chi^2(1) = 0.22$	.64		
Oblique vs. Φ_{32} , $\Phi_{43} = 1$	$\Delta\chi^2(1) = 9.99$	< .01		

The findings presented in table 6.5 suggest that most of the Φ parameters are less than unity. The comparison between the model with oblique trait factors and the model with one general trait resulted in a significantly better statistical fit of the first model. In the trait-only model with oblique trait factors, the Φ_{32} parameter was closest to one and Φ_{43} the second closest to one. For this reason, two separate models were specified with respectively Φ_{32} constrained to unity and both Φ_{32} and Φ_{43} constrained to unity. Comparison of these models with the model with oblique trait factors revealed that the relative influence of buying center members does not significantly differ between the stages 2 and 3. This finding corresponds with the conclusions based on the Campbell-Fisk procedure.

Between-informant agreement

The between-informant agreement can be analyzed by testing if the correlation between method factors in Φ_{MM} significantly differs from unity. This can be tested by

constraining each of the Φ_{MM} intercorrelations (1 general method factor) and comparing the fit of this model with the fit where these parameters were unconstrained (oblique method factors). If the fit of the second model is not significantly better than that of the first model, the more constrained model should be accepted indicating that the responses of the two informants do not differ significantly from each other. The results of this comparison are presented in table 6.6.

The finding presented in table 6.6 suggests that the fit of the method-only model with the oblique method factors is not significantly better than the fit of the method-only model with one general method. In accordance with earlier findings, the responses of the two informants do not differ significantly from each other. One informant is sufficient to measure the relative influence of buying center members.

Table 6.6 *Summary of the nested confirmatory factor analysis tests for method-only models*

Method-only models	χ^2 *test*	*p*	*rho* (ρ)	*delta* (δ)
Oblique method factors	$\chi^2(34) = 200.50$	$< .01$	.77	.80
1 general method factor	$\chi^2(35) = 202.00$	$< .01$	.78	.80
Model comparisons		.22		
Oblique vs. 1 general trait	$\Delta\chi^2(1) = 1.50$			

6.6 SELF-AGGRANDIZEMENT BIAS

The kind of self-aggrandizement bias is tested with the paired difference test. With this test the influence an informant attributes to himself is compared with the influence attributed to him by the other informant. The results of this test are presented in table 6.7. The analysis is based on the reports from 128 informants out of 64 farms. With respect to some stages, the number of informants is lower than 128, because few informants stated that this stage did not exist.

Table 6.7. *A comparison between the influence that an informant attributes to himself and the influence that is attributed to him by the other informant*

	N	*MD*	*t-value*	*p*
Stage 1	122	-1.67	-0.98	.33
Stage 2	126	6.17	3.88	< .01
Stage 3	124	2.38	1.63	.11
Stage 4	128	0.41	0.27	.79
Stage 5	128	1.45	0.84	.40

N = number of subjects
MD = mean difference between the informants' reports

A positive value in the MD column of table 6.7 reflects that an informant attributes more influence to himself than the other informant attributes to him. The null hypothesis that an informant attributes equal influence to himself than the other informant attributes to him, is rejected only in stage 2. In the other stages of the decision process an informant does not attribute significantly more influence to himself than the other informant attributes to him.

6.7 CONCLUSIONS

While some caution is needed because of the small size of the convenience sample, the foregoing results permit the following conclusions:

1. There is a very high between-informant agreement on the perceived relative influence of buying center members with respect to extended buying decisions on farms. Thus, one informant per farm seems appropriate to measure the relative influence of buying center members on farms.
2. A measure related to the four stages of the buying process, i.e. problem recognition, information search/evaluation of alternatives, final decision and execution of purchase, is needed to determine the influence of a buying center member with respect to a particular buying decision.
3. The self-aggrandizement position bias in relation to buying decisions on farms is not as high as was suggested by Silk and Kalwani (1982).

In view of these conclusions and taking into consideration the length and the complexity of the interview, only one informant per farm was interviewed in our empirical study.

CHAPTER SEVEN

EXTENSIVENESS OF THE BUYING PROCESS

7.1 INTRODUCTION

This chapter deals with the empirical results concerning the extensiveness of the buying process. Farmers' buying process is a problem-solving process. Depending on the buying situation, farmers' problem-solving effort may vary from very extensive to routinized. Three levels of problem-solving activity can be distinguished: extensive problem solving (EPS), limited problem solving (LPS), and routine problem solving (RPS). Both EPS and LPS involve some degree of information search and evaluation of alternatives. These types of problem solving occur when products are bought infrequently, like equipment. On the other hand, in the case of buying materials, like compound feed, fertilizer and crop protection products, RPS occurs. Farmers generally order the desired amount of the product from the current supplier without evaluating other alternatives. The purchase is carried out within the conditions agreed upon without further negotiations. Farmers may compare the current supplier with others occasionally, for example once a year, in order to keep themselves informed about the market.

Extensiveness of the buying process is the amount of information acquisition and evaluation of alternatives on the part of the farmer in order to prepare himself for the purchase of a farm input. This variable characterizes farmers' buying process as a whole. It is a continuous variable, which comprises the various patterns of buying behavior as described in the buying behavior literature.

Based on our model of farmers' buying behavior, which is discussed in chapter four, a number of hypotheses about the influence of product-related characteristics, farm enterprise characteristics and individual characteristics on the extensiveness of the buying process are formulated in section 7.2. Followed by two sections (7.3 and 7.4) where the results with respect to equipment/financial loan and materials are presented. Finally, some major findings and conclusions are discussed in section 7.5.

7.2 HYPOTHESES AND DATA ANALYSIS PROCEDURE

7.2.1 Hypotheses

As discussed in chapter four, farmers' buying decisions are made in an environment which exerts numerous and complex influences on the farmer. The extensiveness of the buying process is influenced by one or a combination of such complexities. These influences can be used to predict the extensiveness of the buying process in a particular buying situation. Farmers are assumed to extend their problem-solving effort as long as the expected rewards of doing so exceed the costs. Based on this assumption, a number of hypotheses are proposed. These hypotheses are briefly explained here, since a more elaborate argumentation of these hypotheses was given in section 4.3.

Our attention is focused on the direct influence of the following explanatory variables on the extensiveness of the buying process: (1) product-related characteristics, i.e. services versus tangible goods, market penetration, purchase complexity, and product importance; (2) farm enterprise characteristics, i.e. type of farming; (3) individual characteristics, i.e. buying experience, product involvement, quality-consciousness, and market orientation; (4) relationship with the vendor.

There are also a number of relationships between the explanatory variables. By taking these relationships into account, the total effect on the extensiveness of the buying process may consist of two parts: (i) a direct effect and (ii) an indirect effect via another explanatory variable. Thus, a causal model will be proposed with the extensiveness of the buying process as the focal variable.

The discussion of the hypotheses is divided into two parts. First, we shall cover the proposed direct effects of the explanatory variables on the extensiveness of the buying process. Second, we shall deal with the relationships between the explanatory variables, which have to be determined in order to distinguish between the direct and indirect effects.

The direct effects on the extensiveness of the buying process

Product-related characteristics

$H_{1.1}$: *The buying process is less extensive for buying services than for buying tangible goods.*

It is very difficult to evaluate services because little adequate prepurchase information is available. Since services attach only few search attributes and

many experience and credence attributes, evaluation occurs mainly after purchase and use. Because of smaller benefits expected from preparation activities (information search and evaluation of alternatives), farmers exhibit fewer prepurchase activities with buying services than with buying tangible goods.

$H_{1.2}$: *An increasing market penetration of the product decreases the extensiveness of the buying process.*

The market penetration of the product refers to the percentage of potential users who have bought and adopted the product. It concerns the position of a product in its product life cycle (PLC).

The problem-solving efforts are most extensive during the introduction stage of the PLC. Both the product class and the choice alternatives are unfamiliar and consequently the information requirements are high. Farmers who buy a product in the early stages of its PLC have to rely on an external information search due to their lack of experience. In contrast, farmers' problem-solving efforts are least extensive during the maturity stage of the PLC. In the latter situation, farmers are familiar with the product category and its alternatives.

$H_{1.3}$: *High purchase complexity causes an extended buying process.*

Purchase complexity refers to the task uncertainty due to a perceived lack of relevant buying information. This task uncertainty leads to high levels of perceived risk. Farmers may use external information search and evaluation of alternatives as an uncertainty reducing strategy.

$H_{1.4}$: *The buying process is more extensive when the product is more important.*

Product importance is the perceived significance of the buying decision in terms of the size of the purchase and/or the potential impact of the purchase on the functioning of the farm. We expect that product importance determines the hierarchy in the various buying decisions and consequently the allocation of buying time. Therefore, the buying process is more extensive in the case of buying important products than with buying unimportant products.

Farm enterprise characteristics

H_2: *The extensiveness of buying process depends on the type of farming.*

The type of farming determines the seasonality in work load. Arable farmers, greenhouse market gardeners and dairy farmers have a quiet period during the

year of diminishing duration respectively. Pig farmers, on the other hand, have an almost constant work load throughout the year. It is hypothesized that the buying process of pig farmers is less extensive compared to that of the other farmers since the latter can allocate more time to purchasing during the periods of low work load.

Individual characteristics

$H_{3.1}$: *Buying experience is negatively related to the extensiveness of the buying process.*

Buying experience is the number of times that a farmer has bought a particular product. Based on the psychology of simplification, farmers tend to put less effort into the buying process as a result of their learning over time. Furthermore, the farmer with more buying experience has also more confidence in his decision making.

$H_{3.2}$: *The buying process of farmers with high levels of ongoing search activities is more extensive compared with farmers with fewer ongoing search activities.*

Ongoing search is an expression of product involvement leading to product knowledge. Farmers who are experts regarding particular products put more effort in buying these products because they are more able to integrate new information and to analyze the problem, and they are more aware of potential problems, and of higher personal and social risks.

$H_{3.3}$: *The buying process is more extensive for quality-conscious farmers than for farmers who are less quality-conscious.*

Quality-consciousness of farmers affects the relative weight of perceived quality in choice behavior. Much information is needed and many alternatives should be evaluated in order to adequately judge the quality level of the available alternatives. For this reason, we expect that quality-consciousness is positively related to the levels of problem-solving effort.

$H_{3.4}$: *Market orientation of a farmer is positively related to the extensiveness of the buying process.*

Market orientation of the farmer is a mental predisposition to create superior value for his targeted customers most effectively and most efficiently. Market-oriented farmers try to improve their output by better inputs. They probably perceive higher benefits from problem-solving activity in purchasing than other

farmers. Consequently, the buying process of market-oriented farmers is more extended.

Type of relationship with the vendor

H_4: *A personal relationship with a vendor is negatively related to the extensiveness of farmer's buying process.*

An interactive relationship between the farmer and his vendor may range from a formal or business relationship to a close personal relationship. The latter relationship is characterized by mutual recognition and reciprocal knowledge as individuals. Such a relationship arises when both parties devote personal resources, like money and time, to the relationship (idiosyncratic investments). Personal relationships are based on mutual trust and commitment. A personal relationship with a vendor decreases the evaluation of alternatives, because the switching costs are relatively high. Besides, the choice of a well-known and trustworthy supplier is a strategy to reduce buying risks.

The relationships between explanatory variables of the extensiveness of the buying process

In addition to the direct effects of the explanatory variables on the extensiveness of the buying process, indirect effects may be found due to relationships between these explanatory variables. These indirect effects are essential to determine the total effect of an explanatory variable on the extensiveness of the buying process.

Type of relationship with the vendor

The existence of a personal relationship depends on market penetration (negative), purchase complexity (positive), product importance (positive), quality-consciousness (positive), and age (positive). In high-risk situations, farmers tend to reduce their risk by choosing a familiar and reliable supplier. If a relationship between a farmer and his vendor has evolved into a personal relationship, this vendor is the most eligible alternative in high-risk situations. In addition, a quality-conscious farmer prefers to choose a vendor with whom he has a personal relationship, because he can trust this vendor. If he shifts to a different vendor, he is exposed to the risk that the vendor does not meet his quality requirements. Finally, based on personal interviews with farmers, it is predicted that older farmers value existing relationships with vendors more than younger farmers.

Purchase complexity

Purchase complexity is influenced by product importance (positive), market penetration (negative), buying experience (negative), product involvement (positive), quality consciousness (positive) and age (negative). We expect that farmers trivialize purchase complexity when buying unimportant products and are aware of it only when buying important products. Farmers also perceive a lack of buying information when buying products with a low market penetration and when they have less buying experience. Moreover, it is predicted that farmers foresee more problems - which increases the purchase complexity - when the product class meets important values and goals (high product involvement) and when they are quality-conscious. Since older farmers have more general buying experience, we expect that they perceive less purchase complexity.

Buying experience

Buying experience is obviously influenced by market penetration and age.

Table 7.1 *Summary of the hypotheses concerning the relationships between the extensiveness of the buying process and a number of explanatory variables*

	Endogenous variables			
Explanatory variables	*Extensiveness of buying process*	Personal relationship	Purchase complexity	Buying experience
Product-related characteristics				
• type of product: service	−			
• market penetration	−	−	−	+
• purchase complexity	+	+		
• product importance	+	+	+	
Farm enterprise characteristics				
• type of farming compared to pig farming:				
- arable farming	+			
- dairy farming	+			
- greenhouse market gardening	+			
Individual characteristics				
• buying experience	−		−	
• product involvement	+		+	
• quality-consciousness	+	+	+	
• market orientation	+			
• age		+	−	+
Type of relationship with vendor				
• personal relationship	−			

Summary of hypotheses

A summary of the hypothesized relationships is presented in table 7.1. The full set of hypotheses leads to a recursive system of equations with a number of exogenous variables, which are determined by causes outside the model, and four endogenous variables, which are explained by exogenous and endogenous variables in the system. The endogenous variables of the model are the extensiveness of the buying process, the personal relationship with vendor, purchase complexity and buying experience, of which the first mentioned variable is the focal variable.
Path analysis is a suitable method for studying patterns of causation among a set of variables as presented in table 7.1. Given the recursive nature of our model, the path analysis can be performed by a number of regression analyses. Below, the procedure adopted will be explained in more detail.

7.2.2 Path analysis

The analytic model presented in table 7.1 consists of a set of recursive equations. This model can be parameterized by ordinary least square (OLS) regression analysis (Pedhazur 1982; Dillon and Goldstein 1984). The effects of variables can be denoted by their standardized regression coefficients (β) or path coefficients. The total association between an exogenous and an endogenous variable, or between two endogenous variables can be decomposed into the following components (Alwin and Hauser 1975):

1. *direct effect* of one variable upon the other variable;
2. *indirect effect* via mediating variables;
3. *unanalyzed effects* due to correlated causes;
4. *spurious effects* due to common causes.

The sum of the direct effect and the indirect effects is called the *total effect* of one variable on another. The sum of the unanalyzed and spurious effects is often referred to as the noncausal part of the correlation coefficient (Pedhazur 1982). In our analyses, we focus on the direct and indirect effects of an explanatory variable on the extensiveness of the buying process.
The proposed causal model is an overidentified model containing hypotheses claiming that certain path coefficients are equal to zero. Such an overidentified model can be tested for significance. We will use the significance test proposed by Pedhazur (1982) and Dillon and Goldstein (1984). Tests of overidentified models are based on a comparison of the observed and the reproduced correlation matrices. Determinants of these matrices are used to calculate a χ^2 with a degree of freedom

equal to the number of overidentifying restrictions. Rejection of the null hypothesis indicates that the model does not fit the data. The larger the probability associated with the χ^2, the better the fit of the model to the data. When the correlation matrix can be reproduced exactly, the χ^2 is zero indicating a perfect fit. In order to test an overidentified model, the following measure of goodness of fit can be calculated:

$$Q = \frac{1 - R^2_m}{1 - M} \qquad \begin{aligned} R^2_m &= 1 - (1 - R^2_1)\,(1 - R^2_2) \ldots . (1 - R^2_p) \\ M &= 1 - (1 - R^2_1)\,(1 - R^2_2) \ldots . (1 - R^2_p), \end{aligned}$$

where the calculation of R^2_m is based on the R^2's of the fully recursive model (an exactly identified model) and M is based on the R^2's of the proposed overidentified model. Therefore, M can take values between zero and R^2_m. When the fit of an overidentified model is perfect: $R^2_m = M$. For large samples, the measure of goodness of fit, Q, can be tested for significance as follows:

$$W = -(N - d) \ln Q = -(N - d) \ln \left[\frac{1 - R^2_m}{1 - M} \right]$$

where N = sample size and d = number of overidentifying restrictions.

W has an approximate χ^2 distribution with d degrees of freedom. As with other test statistics with a χ^2 distribution, W is directly affected by the sample size. In case of large samples, there is a high probability that even if a model fits the data well it is rejected on grounds of the test of statistical significance. Since our analyses are based on relatively large samples, we will particularly pay attention to Q, the measure of goodness of fit, which is independent of sample size. The closer Q is to one, the better the fit of the model to the data.

Since we used OLS for the estimation of the parameters, we tested for heteroskedasticity by means of the tests suggested by White (1980) and Ramsey (1967). In case of heteroskedasticity problems, we corrected the estimator of the covariance matrix of the least square estimates by a procedure as proposed by White (1980). This procedure is recommended in case of large samples when there is heteroskedasticity of unknown form (c.f., Davidson and MacKinnon 1993, p. 552-553).

7.3 EXTENSIVENESS OF THE BUYING PROCESS FOR BUYING EQUIPMENT AND CONTRACTING A FINANCIAL LOAN

Extensiveness of the buying process for buying equipment and contracting a financial loan ($PROCESS_{eq/fl}$) was operationalized as the problem-solving effort during a particular transaction, since some degree of information search and evaluation of

alternatives is always undertaken. This variable was assessed by a six-item measure, Cronbach's α value being .80 (n = 809, see section 5.3.1 and Exhibit II, table II.1). In section 7.3.1, the extensiveness of the buying process is compared for different types of equipment and a financial loan. Since certain product-related variables (i.e. purchase complexity and product importance) were not operationalized with respect to contracting a financial loan of more than Dfl 50,000, the difference of the extensiveness of the buying process between services (financial loan) and tangible goods (equipment) was tested by a multivariate analysis of covariances. In section 7.3.2, the path analysis results for equipment are presented and discussed.

7.3.1 Comparison of the extensiveness of the buying process

In order to compute an overall score of $PROCESS_{eq/fl}$, the scores of the six items had to be standardized, because they were measured on different scales. The average scores of $PROCESS_{eq/fl}$ for the different types of farming and for the types of equipment/financial loan are presented in table 7.2. The scores were transformed into a score between 0 and 10 for ease of interpretation.

Table 7.2 *The average extensiveness of the buying process for the various types of farming and for the different types of equipment or a financial loan*

Types of input	Types of farming							
	Arable farming		Dairy farming		Pig farming		Greenhouse market gardening	
Equipment:	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
• Tractor	3.45 (n = 81)	.27	3.13 (n = 93)	.23				
• Fertilizer-spreader	3.52 (n = 63)	.26	2.30 (n = 70)	.19				
• Process-automation systems:								
- Climate-computer					3.48 (n = 65)	.27	4.11 (n = 36)	.38
- Hydroponics-computer							5.10 (n = 34)	.39
- Feeding-computer			4.69 (n = 62)	.32	5.77 (n = 17)	.66		
Service:								
• Financial loan > Dfl 50,000	2.47 (n = 63)	.22	1.95 (n = 84)	.17	2.27 (n = 83)	.19	2.25 (n = 58)	.20

S.E. = standard error of the mean
minimum = 0, maximum = 10

Table 7.2 indicates that the most extensive buying process occurred when buying a process-automation system. This finding is expected because of the innovative nature of this product. A remarkable finding is the low extensiveness of the buying process when contracting a loan of more than Dfl 50,000. For all types of farming, the least problem solving activity occurs regarding these buying problems. Especially, the buying decision time and the total number of evaluated alternatives are relatively low, on average 6 - 8 weeks and 1 - 1.4 banks respectively.

Hypothesis ($H_{1.1}$) that the buying process is less extensive when buying services than in case of buying goods was tested by a multivariate analysis of covariances (MANCOVA) with the type of product (2 categories: financial loan versus equipment) and the type of farming (4 categories) as independent nominal variables. Other related variables, like buying experience, product involvement, quality-consciousness, market orientation, and the existence of a personal relationship with vendor (see table 7.1), were used as covariates. Variation in the extensiveness of the buying process, which was associated with one or more covariates, was removed before carrying out an analysis of variance of the adjusted dependent variable. A MANCOVA of the extensiveness of the buying process on the type of product and the type of farming yield a significant main effect for type of product $F_{1,771} = 65.52$ ($p < .01$), a non-significant ($\alpha = .05$) main effect for type of farming, $F_{3,771} = 2.24$ ($p = .082$), and a non-significant interaction effect, $F_{3,771} = 1.39$ ($p = .246$). All covariates except age show a significant effect on the extensiveness of the buying process ($\alpha = .05$). We find that the buying process is less extensive when contracting a financial loan (service) than when buying equipment. This finding is supporting hypothesis $H_{1.1}$ that fewer prepurchase activities are exhibited when buying services compared with buying goods.

7.3.2 Path analysis results for equipment

Path analysis was used to assess the parameters of the recursive system of equations presented in table 7.1. The results of the four regression analyses are presented in table 7.3. This table reports the path coefficients ('betas') and the *t*-statistic. The effect of the explanatory variables on the endogenous variables was tested one-tailed because a direction was hypothesized a priori.

Table 7.3 *Path analysis results for equipment with the extensiveness of the buying process as the focal variable (direct effects, β-coefficients)*

Explanatory variables	Endogenous variables			
	Extensiveness buying process ($PROCESS_{eq(i)}$)	Personal relationship (*RELVEN*)	Purchase complexity ($COMP_{eq}$)	Buying experience (*BUYEXP*)
Product-related characteristics				
market penetration (*MARKPEN*)	-.314 (-4.52)**	.025 (.46)	-.292 (-5.95)**	.481 (12.76)**
purchase complexity ($COMP_{eq}$)	.101 (2.04)*	.159 (3.09)**		
product importance:				
- financial ($IMPOR1_{eq}$)	.062 (1.37)	-.057 (-1.19)	.343 (8.80)**	
- end-product ($IMPOR2_{eq}$)	.108 (2.42)**	.101 (2.21)*	.011 (.28)	
- prod. process ($IMPOR3_{eq}$)	.047 (1.07)	.007 (.14)	.098 (2.30)*	
Farm enterprise characteristics				
type of farming compared to pig farming:				
- arable farming (*TYPEAF*)	.194 (2.58)**			
- dairy farming (*TYPEDF*)	.174 (2.43)**			
- greenh. mark. gard. (*TYPEMG*)	.032 (.58)			
Individual characteristics				
buying experience (*BUYEXP*)	-.097 (-2.18)*		-.093 (-2.06)*	
product involvement (*PRODINV*)	.179 (4.00)**		.094 (2.45)**	
quality-consciousn. (*QUALCON*)	-.036 (-.79)	.213 (4.87)**	-.039 (-1.01)	
market orientation (*MARKOR*)	.083 (2.01)*			
age (*AGE*)		.112 (2.54)**	-.014 (-.35)	.216 (5.72)**
Relationship with vendor				
personal relationship (*RELVEN*)	-.172 (-4.62)**			
	R^2 = .215	R^2 = .089	R^2 = .311	R^2 = .297
	$F_{13,487}$ = 10.25**	$F_{7,493}$ = 6.84**	$F_{8,492}$ = 27.75**	$F_{2,498}$ = 105.04**
	n = 501	n = 501	n = 501	n = 501

t-statistics are in parentheses; the *t*-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
** significant at $p < .01$
* significant at $p < .05$

Table 7.3 shows that most of the proposed associations are supported empirically in the expected direction. R^2 for the first equation with extensiveness of the buying process as dependent variable is .215. The measure of goodness of fit, Q, for testing overidentified models is .911. The result of the significance test for Q is: $W = 44.8$ ($N = 501$ and $d = 20$), $p < .01$. The fit of the overidentified model is rejected on grounds of the test of statistical significance. However, we accept the proposed

model as an adequate fit to the data, since Q is very close to one and the significance test is affected by the sample size.

The market penetration of the product (*MARKPEN*) has by far the highest effect (−.314) on the extensiveness of the buying process. This finding supports hypothesis $H_{1.2}$ that increasing market penetration decreases the extensiveness of the buying process. The effect of the following variables on the extensiveness of the buying process is also significant ($p < .05$ and in order of importance):

PRODINV Farmers with high levels of ongoing search put more effort in buying activities for equipment than farmers with less ongoing search activities (+.179): hypothesis $H_{3.2}$ is supported.

TYPE The buying process of arable farmers and dairy farmers is more extensive than the buying process of pig farmers (+.194 and +.174 respectively). The differences between market gardeners and pig farmers are not significant. Thus, the extensiveness of the buying process depends on the type of farming (H_2), although the prediction of the direction of the relationship is not entirely supported.

RELVEN A personal relationship with a vendor decreases the extensiveness of the buying process (−.172): hypothesis H_4 is supported.

$IMPOR2_{eq}$ When an equipment is more important in relation to the structure of the farm enterprise, the buying process is more extensive (+.108). With respect to end-product importance, hypothesis $H_{1.4}$ is supported.

$COMP_{eq}$ High purchase complexity increases the extensiveness of the buying process (+.101): hypothesis $H_{1.3}$ is supported.

BUYEXP Farmers with more buying experience have a less extensive buying process (−.097): hypothesis $H_{3.1}$ is supported.

MARKOR Market-oriented farmers are more willing to put efforts in their buying activities for equipment than other farmers (+.083): hypothesis $H_{3.4}$ is supported.

Some of the stated hypotheses are not supported. The hypothesized effects of the financial importance ($H_{1.4}$), the production process importance ($H_{1.4}$) and the quality-consciousness of the farmer ($H_{3.3}$) on the extensiveness of the buying process are not significant.

Consistent with the hypotheses, table 7.3 also shows that the presence of a personal relationship with the chosen vendor is significantly influenced by the quality-consciousness of the farmer (+.213), purchase complexity (+.159), age (+.112), and end-product importance (+.101). Purchase complexity is significantly affected by the financial importance of the product (+.343), market penetration (−.292),

production-process importance (+.098), product involvement (+.094), and buying experience (−.093). The expected effect of end-product importance, quality-consciousness, and age on purchase complexity is not significant. Finally, as expected, market penetration of the product (+.481) and age of the farmer (+.216) affect buying experience significantly. A schematic overview of the major effects is presented in figure 7.1.

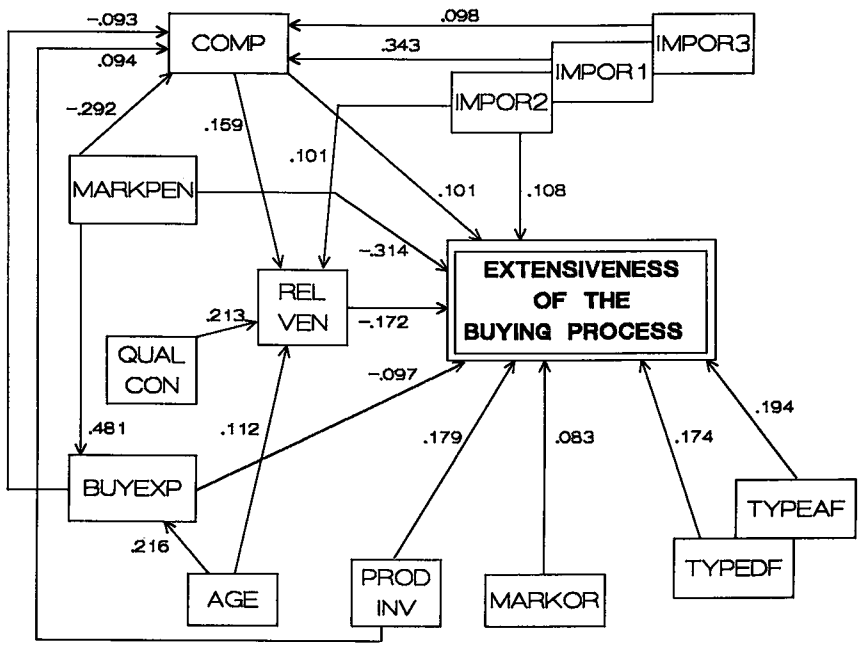

Figure 7.1 *Summary overview of the path analysis results for equipment (significant effects only)*

Figure 7.1 shows, among others, that for example market penetration of the product (*MARKPEN*) has a direct and an indirect effect (via *COMP* and *BUYEXP*) on the extensiveness of the buying process. The sum of the direct and indirect effects is the total effect of one variable on the other. Table 7.4 presents the total effect of the explanatory variables on the extensiveness of the buying process.

The market penetration of the product (−.390) is the most important variable for explaining the extensiveness of the buying process. The strong negative direct effect is particularly increased by an indirect effect via buying experience and purchase complexity. The buying process of farmers is relatively extensive in the early stages

of the PLC and relatively brief in the maturity stage. The total effect of the financial importance of products on the extensiveness of the buying process is increased by an indirect effect from purchase complexity. In spite of the indirect effect via the personal relationship with a vendor, the total effect of the quality-consciousness on the extensiveness of the buying process is small. Finally, a weak indirect effect of age on the extensiveness of the buying process is found through buying experience and the existence of a personal relationship with vendor.

Table 7.4 *Decomposition of the effects on the extensiveness of the buying process regarding equipment*

	Total effect	Direct effect	Indirect effect
Product-related characteristics			
market penetration (*MARKPEN*)	-.390	-.314	-.076
purchase complexity ($COMP_{eq}$)	.074	.101	-.027
product importance:			
- financial ($IMPOR1_{eq}$)	.097	.062	.035
- end-product ($IMPOR2_{eq}$)	.091	.108	-.017
- prod. process ($IMPOR3_{eq}$)	.053	.047	.006
Farm enterprise characteristics			
type of farming compared to pig farming:			
- arable farming (*TYPEAF*)	.194	.194	——
- dairy farming (*TYPEDF*)	.174	.174	——
- greenh. mark. gard. (*TYPEMG*)	.032	.032	——
Individual characteristics			
buying experience (*BUYEXP*)	-.104	-.097	-.007
product involvement (*PRODINV*)	.186	.179	.007
quality-consciousn. (*QUALCON*)	-.076	-.036	-.040
market orientation (*MARKOR*)	.083	.083	——
age (*AGE*)	-.043	——	-.043
Relationship with vendor			
personal relationship (*RELVEN*)	-.172	-.172	——

7.4 EXTENSIVENESS OF THE BUYING PROCESS FOR BUYING MATERIALS

Extensiveness of the buying process for buying materials ($PROCESS_{mat}$) was operationalized as the frequency of evaluating other alternatives (number of times per year). First, the extensiveness of the buying process is compared for different types of materials followed by a discussion of some specific hypotheses regarding

buying materials. The path analysis results for materials are presented and discussed in section 7.4.3.

7.4.1 Comparison of the extensiveness of the buying process

Table 7.5 presents the mean scores of $PROCESS_{mat}$ for the various types of farming and types of materials. The table indicates that other suppliers are often evaluated by dairy and pig farmers in the case of buying compound feed and by market gardeners when buying crop protection products. In general, fertilizer is bought routinely from the same supplier without evaluating others. A remarkable finding is that arable farmers put less buying effort in buying materials than other farmers.

Table 7.5 *Frequency of evaluating other farm input suppliers (# times/year) for the various types of farming and types of materials*

Types of materials	Types of farming							
	Arable farming		Dairy farming		Pig farming		Greenhouse market gardening	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
• Compound feed			1.31 (n = 170)	.11	1.25 (n = 182)	.10		
• Fertilizer	.38 (n = 83)	.07	.75 (n = 147)	.09			.87 (n = 71)	.11
• Crop protection products	.86 (n = 97)	.11					1.31 (n = 58)	.18

S.E. = standard error of the mean

7.4.2 Some specific hypothesis on buying materials

Due to the specific characteristics of materials, some modifications have been made regarding the set of hypotheses discussed in section 7.2. First, market penetration is not relevant as a product-related characteristic, because the questions in our study referred to broad product classes, like compound feed, fertilizer and crop protection products, without further itemization. Almost all farmers of the research population used these products, i.e. market penetration of more than 90%.

Second, with respect to buying materials, age and buying experience are similar variables. Farmers have to buy materials several times a year and consequently older farmers obviously have more buying experience than younger farmers. For this reason, age is used as an indicator for the buying experience of farmers with respect

to buying materials. Third, membership of farm purchasing cooperatives is relevant as to buying materials. Because of the high buying frequency and the high complexity of the buying task, member-farmers may delegate the buying activities of materials to their cooperatives. As a result of this delegation of buying activities, these farmers may buy materials with minimal cognitive efforts. They expect that their farm purchasing cooperative offers the best materials for their farm. Farmers who buy their products from private companies take the responsibility for the buying activities themselves. Based on this reasoning, it is predicted that farmers who buy products from farm purchasing cooperatives put less effort in their buying activities than other farmers.

The hypotheses regarding buying materials are summarized in table 7.6.

Table 7.6 *Summary of the hypothesized relationships between the frequency of evaluating other farm input suppliers (# times/year) and a number of explanatory variables*

	Endogenous variables		
Explanatory variables	*Extensiveness of buying process*	Personal relationship	Purchase complexity
Product-related characteristics			
• purchase complexity	+	+	
• product importance	+	+	+
Farm enterprise characteristics			
type of farming compared to pig farming:			
• arable farming	+		
• dairy farming	+		
• greenhouse market gardening	+		
Individual characteristics			
• product involvement	+		
• quality-consciousness	+	+	+
• output-market orientation	+		+
• age	−		−
Type of relationship with vendor			
• personal relationship	−		
• type of supplier: cooperative	−		

7.4.3 Path analysis results for materials

Three regression analyses were performed to assess the parameters of the recursive system of equations as presented in table 7.6. The path coefficients ('betas') and the *t*-statistic of these equations are presented in table 7.7. The effect of the explanatory

variables on the endogenous variables was tested one-tailed because a direction was hypothesized a priori.

Table 7.7 *Path analysis results for materials (direct effects, β-coefficients)*

Explanatory variables	Endogenous variables		
	Extensiveness of buying process (*PROCESS*$_{mat}$)	Personal relationship (*RELVEN*)	Purchase complexity (*COMP*$_{mat}$)
Product-related characteristics			
purchase complexity (*COMP*$_{mat}$)	.052 (1.48)	.144 (3.98)**	
product importance:			
- financial (*IMPOR1*$_{mat}$)	.147 (3.19)**	.076 (2.14)*	.283 (8.54)**
- end-product (*IMPOR2*$_{mat}$)	.011 (.32)	-.077 (-2.28)*	.078 (2.38)**
Farm enterprise characteristics			
type of farming compared to pig farming:			
- arable farming (*TYPEAF*)	-.183 (-3.93)**		
- dairy farming (*TYPEDF*)	.037 (.64)		
- greenh. mark. gard. (*TYPEMG*)	-.012 (-.21)		
Individual characteristics			
product involvement (*PRODINV*)	.164 (4.64)**		.171 (5.10)**
quality-consciousn. (*QUALCON*)	.008 (.20)	.301 (8.84)**	.166 (4.94)**
market orientation (*MARKOR*)	.107 (2.79)**		
age (*AGE*)	-.086 (-2.50)**	.135 (4.03)**	-.107 (-3.29)**
Relationship with vendor			
personal relationship (*RELVEN*)	-.175 (-4.95)**		
type of supplier: cooperative (*COOP*)	-.151 (-4.36)**		
	R^2 = .170	R^2 = .150	R^2 = .190
	$F_{12,772}$ = 13.18**	$F_{5,779}$ = 27.55**	$F_{5,779}$ = 36.55**
	n = 785	n = 785	n = 785

t-statistics are in parentheses; the *t*-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
** significant at $p < .01$
* significant at $p < .05$

Table 7.7 shows that most of the proposed associations are supported empirically in the expected direction. R^2 for the first equation with the extensiveness of the buying process as the dependent variable is .170. The measure of goodness of fit, Q, for testing the overidentified models is .947. The result of the significance test for Q is: $W = 42.1$ ($N = 785$ and $d = 11$), $p < .01$. The fit of the overidentified model is rejected on grounds of the test of statistical significance. However, we accept the

proposed model as an adequate fit to the data, since Q is very close to one and the significance test is affected by the sample size.

The effect of the following variables on the extensiveness of the buying process is significant ($p < .05$ and in order of importance):

TYPE Contrary to hypothesis H_2, the frequency of evaluating other suppliers is lower for arable farmers than for pig farmers (−.183). The differences between dairy versus pig farmers and market gardeners versus pig farmers are not significant. Apparently, arable farmers buy materials very routinely.

RELVEN Farmers who have a personal relationship with their vendor investigate alternatives less frequently than other farmers (−.175): hypothesis H_4 is supported.

PRODINV Farmers with high levels of ongoing search evaluate other suppliers more frequently than farmers with less ongoing search activity (+.164): hypothesis $H_{3.2}$ is supported.

COOP Corresponding with the expectations, farmers who buy materials from farm purchasing cooperatives, put less effort in their buying activities than other farmers (−.151).

$IMPOR1_{mat}$ The financial importance of a material increases the frequency of evaluating other alternatives (+.147). With respect to financial importance, hypothesis $H_{1.4}$ is supported.

MARKOR Market-oriented farmers are more exploratory in their buying activities for materials than other farmers (+.107): hypothesis $H_{3.4}$ is supported.

AGE Older, more experienced farmers consider other suppliers of farm inputs less frequently than younger farmers.

A number of other hypotheses are not supported. The proposed effect of the purchase complexity ($H_{1.3}$), the end-product importance ($H_{1.4}$), and the quality-consciousness of the farmer ($H_{3.3}$) on the extensiveness of the buying process are not significant.

Table 7.7 also shows that the presence of a personal relationship with the current vendor is significantly influenced by the quality-consciousness of the farmer (+.301), purchase complexity (+.144), age (+.135), financial importance (+.076), and end-product importance (−.077). Although the first four effects are expected, the direction of the last relationship is not hypothesized. Thus, farmers pursue a less personal relationship with their vendor in case of products with high end-product importance. Apparently, farmers prefer flexibility in choosing vendors with respect to these products. As hypothesized, purchase complexity is significantly affected by

the financial importance of the product (+.283), product involvement (+.171), quality-consciousness (+.166), age (−.107), and end-product importance (+.078). A schematic overview of the significant effects is presented in figure 7.2.

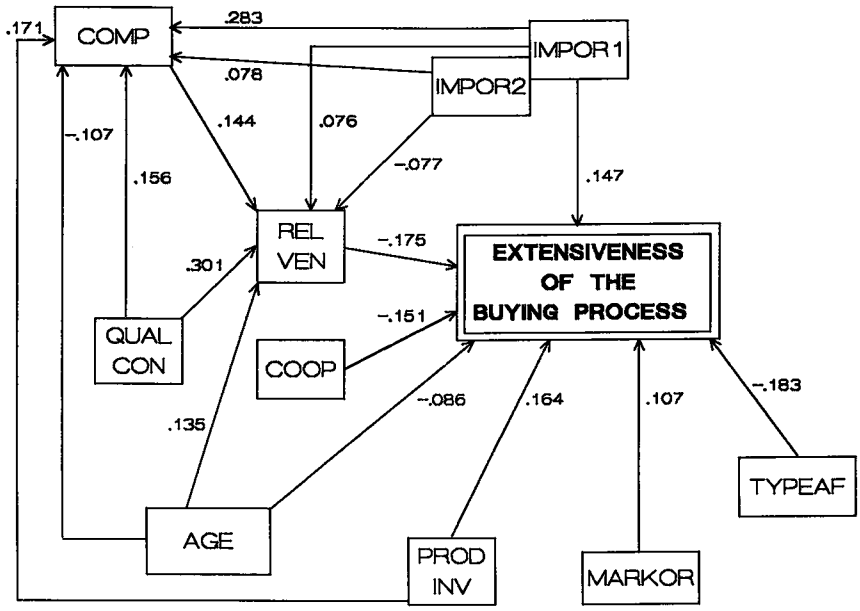

Figure 7.2 *Summary overview of the path analysis results for materials (significant effects only)*

Table 7.8 presents the total effect of the explanatory variables on the extensiveness of the buying process. This table shows that the direct effect on the extensiveness of the buying process is dominant for the majority of the variables. The indirect effects are only important for quality-consciousness and age. The total effect of quality-consciousness on the frequency of evaluating other suppliers becomes slightly negative because of an indirect effect via the presence of a personal relationship. The total negative effect of age is increased because of the indirect paths via personal relationship with a supplier and purchase complexity.

Tabel 7.8 *Decomposition of the effects on the extensiveness of the buying process regarding materials*

	Total effect	Direct effect	Indirect effect
Product-related characteristics			
purchase complexity ($COMP_{mat}$)	.027	.052	-.025
product importance:			
- financial ($IMPOR1_{mat}$)	.141	.147	-.006
- end-product ($IMPOR2_{mat}$)	.027	.011	.016
Farm enterprise characteristics			
type of farming compared to pig farming:			
- arable farming (*TYPEAF*)	-.183	-.183	——
- dairy farming (*TYPEDF*)	.037	.037	——
- greenh. mark. gard. (*TYPEMG*)	-.012	-.012	——
Individual characteristics			
product involvement (*PRODINV*)	.169	.164	.005
quality-consciousn. (*QUALCON*)	-.040	.008	-.048
market orientation (*MARKOR*)	.107	.107	——
age (*AGE*)	-.113	-.086	-.027
Relationship with vendor			
personal relationship (*RELVEN*)	-.175	-.175	——
type of supplier: cooperative (*COOP*)	-.151	-.151	——

7.5 MAJOR FINDINGS AND CONCLUSIONS

The total effect of the explanatory variables on the extensiveness of the buying process is summarized in table 7.9.

The results from our study demonstrate that the *psychology of simplification* is a suitable theorem for the explanation of farmers' buying processes. Especially when buying equipment, farmers tend to simplify their buying problems by a process of learning over time. Familiarity with products (i.e. products with a high market penetration) and buying situation (much buying experience) lead to buying processes performed with little cognitive effort and conscious control. In case of familiar products and buying situations, farmers decide very quickly, and they merely examine prices, availability of alternatives and special bargains, without acquiring much new information. In this situation, the marketing strategy of farm input suppliers should be emphasized on the price level, distribution (availability), and brand knowledge (Howard 1989). Presence in the evoked set of farmers is vital.

Contrastingly, in case of innovative products and unfamiliar buying situations (little buying experience), farmers decide very cautiously and slowly. Much information is gathered first and many alternatives are evaluated before making an accurate decision. It follows that the marketing strategy of farm input suppliers should be emphasized on product performance, price-setting in relation to product performance, and personal selling (Howard 1989).

In the case of buying materials, the influence of buying experience (age) on the extensiveness of the buying process is less dominant than for buying equipment. Although the frequency of evaluating other suppliers is significantly lower for older farmers than for younger ones, other factors here are relatively more important.

Table 7.9 *Summary of the total effect of the explanatory variables on the extensiveness of the buying process*

	Extensiveness of the buying process
Product-related characteristics	
type of product: service	−
market penetration[1])	−−
purchase complexity	+/n.s.[3])
product importance:	
- financial importance	+
- end-product importance	+/n.s.[3])
- production process importance[1])	n.s.
Farm enterprise characteristics	
type of farming compared to pig farming:	
- arable farming	++/−−[3])
- dairy farming	++/n.s.[3])
- greenhouse market gardening	n.s.
Individual characteristics	
buying experience (age)	−
product involvement	++
quality-consciousness	n.s.
market orientation	+
Relationship with vendor	
personal relationship	−−
type of supplier: cooperative[2])	−−

++ = strong positive influence, + = positive influence, n.s. = not significant, − = negative influence, −− = strong negative influence

[1]) Only equipment

[2]) Only materials

[3]) Different findings: equipment = before /; materials = after /.

An important explanatory variable for the extensiveness of the buying process for both equipment and materials is *the relationship with the vendor*. A personal

relationship decreases the evaluation of other alternatives. This finding suggests that the agricultural supply industry can bind a farmer by investing into the relationship with the farmer. Personal relationships with the customer (farmer) are an advantage in the competition with other farm input suppliers. This emphasizes the importance of personal selling and management of customer relationships in farm input markets.

Moreover, our findings support the *"enrichment" hypothesis* that existing product knowledge facilitates the learning of new information. Farmers with relatively high levels of ongoing search as a result of product involvement tend to put more effort in their buying activities. Apparently, farmers use the product knowledge to acquire and process information germane to the buying problem. This effect occurs with respect to both materials and equipment. This finding suggests that farm input suppliers can win new customers by arousing farmers' interest in the product. Furthermore, the distinction between buying knowledge and product knowledge is also very useful with respect to farmers' buying processes. Buying knowledge obtained by much buying experience leads to a decreasing extensiveness of the buying process, while product knowledge obtained by ongoing search leads to higher levels of problem-solving activity. Although the indications are clear, more research is needed to support these results.

Buying processes of farmers can be less adequately explained from the *perceived risk* point of view. Although the influence of factors directly related to perceived risk, i.e. purchase complexity and product importance, is statistically significant, the relative influence of these variables is small. A remarkable finding is that the total effect of financial and end-product importance (only case of equipment) is greater than the total effect of purchase complexity on the extensiveness of the buying process, while information search is viewed as an important risk reduction strategy. A possible explanation for this finding is that farmers use multiple risk reduction strategies besides information search, like buying from familiar and/or well-known suppliers, repetition of the last buying decision, or buying a well-known brand. In case of equipment with high end-product importance and materials with high financial importance, farmers spend more time and effort on buying activities.

Finally, extensiveness of the buying process depends on the *type of farming*. In case of equipment, the buying process of arable farmers and dairy farmers is more extended than the buying process of pig farmers, while the differences between greenhouse market gardeners and pig farmers are not statistically significant. Apparently, greenhouse market gardeners do not use the periods of low work load to

devote more time on purchasing. The differences of the extensiveness of the buying process between arable and dairy farmers are quite small, in spite of the longer periods of low work load during the year for the latter farmers. With respect to materials, the differences between the various types of farming are not significant except for arable farming. Contrary to expectations, arable farmers evaluate other suppliers of materials less frequently than other farmers. Arable farmers are evidently not motivated to put much effort in buying materials.

CHAPTER EIGHT

INFORMATION SOURCES

8.1 INTRODUCTION

In order to communicate adequately with his customers, any supplier of farm inputs should understand where and how farmers search for information. This chapter deals with the empirical results concerning the width and the direction of farmers' information search with a view to buy inputs.

Moriarty and Spekman (1984) categorized the various information sources of industrial buyers along two dimensions: *source* (personal versus impersonal) and *type* (commercial versus non-commercial). Engel et al. (1992) used the same dimensions to classify information sources consulted by consumers. The distinction between personal and impersonal sources of information is based on face-to-face versus any other type of communication media. Commercial and non-commercial sources of communication are differentiated on the basis of whether or not the information source or organization represented in and/or sponsoring the message directly benefits financially as a result of a favourable buying decision. A taxonomy of the information sources which can be used by farmers is presented in table 8.1.

Table 8.1 *Taxonomy of information sources used by farmers*

	Personal	*Impersonal*
Commercial	Salespersons Trade shows	Advertising Sales literature (brochures)
Non-commercial	Colleagues/friends Extension service Financial advisors	Articles in farm magazines Test results

In this chapter, we will pay attention to (i) the number of information sources used, and (ii) the contribution of different types of information sources towards the total information acquisition. The number of information sources used refers to the *width*

of information acquisition, i.e. how many different types of information sources are used, independent of the amount of use. The contribution of different types of information sources towards the total information acquisition concerns the *direction* of external search, i.e. which types of information do farmers use to acquire their information. This aspect takes the amount of use of each type of information source into account.

Based on our model of farmers' buying behavior developed in chapter four, a number of hypotheses are formulated in section 8.2 concerning the influence of product-related characteristics, farm enterprise characteristics and individual characteristics on the number of information sources used and the contribution of various types of information sources. Next, the results are presented in the sections 8.3 and 8.4 with respect to buying equipment/financial loan and buying materials. Some general conclusions are drawn in section 8.5.

8.2 HYPOTHESES

8.2.1 Number of information sources used

Like extensiveness of the buying process, the number of information sources used refers to the level of problem-solving activity, i.e. degree of external information search and evaluation of alternatives. Extensiveness of the buying process is a broader concept than the number of information sources used. The latter variable refers to one stage of the buying process, i.e. information search, while the former variable characterizes the buying process as a whole. The number of information sources used is just one aspect of the extensiveness of the buying process. Other aspects are, for instance, decision time and number of alternatives examined.

In order to analyze the width of information acquisition of farmers, we analyze the number of information sources used in addition to the extensiveness of the buying process. Since the former variable is closely related to the latter variable, both variables are assumed to be influenced by the same explanatory variables (see chapter seven). In this chapter, we will propose the hypotheses without further explanation, because the argumentation for these hypotheses is identical to that of the hypotheses discussed in chapter seven. We hypothesize that the following explanatory variables affect the number of information sources used: (1) product-related characteristics, i.e. type of product, market penetration, purchase complexity, and product importance; (2) farm enterprise characteristics, i.e. type of farming; (3)

individual characteristics, i.e. buying experience, product involvement, quality-consciousness, and market orientation; (4) type of relationship with the vendor.

The number of information sources used depends on:

- **product-related characteristics:**
  - $H_{1.1}$: *Fewer information sources are used for buying services than for buying tangible goods.*
  - $H_{1.2}$: *Further market penetration of the product decreases the number of information sources used.*
  - $H_{1.3}$: *Greater purchase complexity increases the number of information sources used.*
  - $H_{1.4}$: *More information sources are used when the product is more important.*
- **farm enterprise characteristics:**
  - H_2: *The number of information sources used depends on the type of farming.* More specifically, it is predicted that pig farmers consult less information sources than other farmers.
- **individual characteristics:**
  - $H_{3.1}$: *More buying experience leads to the use of fewer information sources.*
  - $H_{3.2}$: *Farmers with high levels of ongoing search consult more information sources than farmers with less ongoing search activities.*
  - $H_{3.3}$: *Quality-conscious farmers use more information sources than farmers who are less quality-conscious.*
  - $H_{3.4}$: *Market orientation of farmers results in the use of more information sources.*
- **type of relationship with the vendor:**
  - H_4: *A personal relationship with a vendor decreases the number of information sources consulted.*

These hypotheses are summarized in table 8.2.

As discussed in section 7.2.1, a number of relationships exist between the explanatory variables of the number of information sources used. By taking these relationships into account, the total effect on the number of information sources used may consist of a direct effect and an indirect effect via another explanatory variable. Thus, a causal model is proposed with the number of information sources used as the focal variable. The full set of relationships leads to a recursive system of equations with a number of exogenous variables, which are determined by causes outside the model, and four endogenous variables which are explained by exogenous and endogenous variables in the system (see table 8.2). This system of equations

with four endogenous variables can be analyzed by path analysis (see section 7.2.2). Hypothesis $H_{1.1}$ is tested separately, because with regard to contracting a financial loan certain product-related variables were not operationalized.

Table 8.2 *Summary of the hypotheses concerning the relationships between the number of information sources used and a number of explanatory variables*

	Endogenous variables			
Explanatory variables	*Number of information sources used*	Personal relationship	Purchase complexity	Buying experience
Product-related characteristics				
• type of product: service	–			
• market penetration	–	–	–	+
• purchase complexity	+	+		
• product importance	+	+	+	
Farm enterprise characteristics				
• type of farming compared to pig farming:				
- arable farming	+			
- dairy farming	+			
- greenhouse market gardening	+			
Individual characteristics				
• buying experience	–		–	
• product involvement	+		+	
• quality-consciousness	+	+	+	
• market orientation	+			
• age		+	–	+
Type of relationship with vendor				
• personal relationship	–			

8.2.2 The contribution of information sources towards the total information acquisition

As stated before, information sources can be classified in terms of their *source* (personal versus impersonal) and *type* (commercial versus non-commercial). The distinction between personal and impersonal information sources reflects the flexibility of a sources. Personal sources can be adapted to the individual information needs, are appropriate to provide much information in a short time without much cognitive efforts on the part of the receiver, and consequently, are more penetrating. In general, impersonal sources require greater cognitive efforts in order to acquire the same amount of information.

The commercial versus non-commercial dimension relates to whether or not an information source is prejudiced in favour of an alternative. For instance, a salesman and fellow-farmers are both personal information sources. However, a salesman benefits directly from the purchase and is perceived by the farmer to take a biased position vis-à-vis the various alternatives. In contrast, fellow-farmers are used as information sources because of their unbiased appraisal of competing products.
On the basis of these two dimensions, every information source available to farmers can be characterized. A taxonomy of the information sources which may be used by farmers is presented in table 8.1. The contribution of information sources towards the total information acquisition in order to buy inputs depends on the contextual factors of buying decisions. We propose a number of hypotheses concerning the effect of the following variables on the contribution of information sources: (1) product-related characteristics, i.e. type of product, market penetration, purchase complexity, and product importance; (2) individual characteristics, i.e. buying experience, product involvement, quality-consciousness; (3) relationship with vendor.

Impersonal versus personal information sources

A number of hypotheses concerning the effect of a number of explanatory variables on the contribution of impersonal information sources towards the total information acquisition are proposed first. Since farmers may acquire information from either personal or impersonal information source, an increase of the contribution of impersonal information sources is at the expense of the contribution of personal information sources. Thus, hypotheses on the contribution of personal information sources are the opposite of the hypotheses on the contribution of impersonal information sources.

H_5: *The contribution of impersonal information sources towards the total information acquisition:*
$H_{5.1}$: *depends on whether buying tangible goods or buying services;*
$H_{5.2}$: *is affected by market-penetration of the product (negative);*
$H_{5.3}$: *is affected by product-involvement (positive).*

Hypothesis $H_{5.1}$ is based on the research findings of Murray (1991). In his study, consumers tended to rely more heavily on personal information sources in the case of buying services than with buying tangible goods. Services are difficult to specify or evaluate in advance of the purchase event. Experience is essential in evaluating a service. Consequently, farmers may be compelled to seek information from other

individuals, preferably non-commercial sources, who have experienced the service directly or indirectly. Information about this experience may be used as an approximation for own experiences.
It is hypothesized that the contribution of personal information sources depends on the stage of the product in the PLC. Traditionally, many studies were carried out for agricultural products concerning the contribution of different information sources to the adoption of innovative products (see Rogers 1983 for an overview of the literature). These studies indicated that early adopters tend to rely more heavily on impersonal information sources ($H_{5.2}$), because hardly anybody in the social system is familiar with the product. Moreover, given their socio-economic status and personality, these farmers have a better orientation outside the agricultural system, and have a greater exposure to mass media (Rogers 1983).
Hypothesis $H_{5.3}$ is based on the assumption that the use of impersonal information sources requires more cognitive efforts than the use of personal ones. Product knowledge obtained by ongoing information search facilitates the use of impersonal information sources. Less knowledgeable farmers may feel incompetent to use impersonal information sources. These farmers may rely very heavily on the opinions of other farmers or may adopt the advice of the salesman of a trusted supplier.

Commercial versus non-commercial information sources

We will propose a number of hypotheses concerning the effect of a number of explanatory variables on the contribution of commercial information sources towards the total information acquisition. Since farmers may acquire information from either commercial or non-commercial information sources, an increase of the contribution of commercial information sources is at the expense of the contribution of non-commercial information sources.

H_6: *The contribution of commercial information sources towards the total information acquisition is affected by:*
- $H_{6.1}$: *the existence of a personal relationship with the vendor (positive);*
- $H_{6.2}$: *purchase complexity (negative);*
- $H_{6.3}$: *product importance (negative);*
- $H_{6.4}$: *buying experience (positive);*
- $H_{6.5}$: *product involvement (positive);*
- $H_{6.6}$: *quality-consciousness (negative).*

Hypotheses $H_{6.2}$, $H_{6.3}$ and $H_{6.4}$ are based on the assumption that especially in high-risk situations the contribution of an information source depends on the credibility of the source. In high-risk situations, farmers tend to rely more heavily on unprejudiced, reliable information sources. Commercial sources advocate the products of a particular supplier. In his review of the literature on consumer behavior, Ross (1975) concluded that word-of-mouth (personal non-commercial information sources) functions as an important risk reliever across most types of risk. Moriarty and Spekman (1984) found that industrial buyers rely more heavily on non-commercial information sources when the purchase is felt to contain risk for the buying organization.

By definition, farmers trust the vendor with whom they have a personal relationship. For this reason, we expect that farmers having a personal relationship with their vendor use their vendor more frequently as an information source ($H_{6.1}$). In addition, we expect that product knowledge as a result of ongoing information search increases the ability of farmers to evaluate and to analyze critically the information from information sources ($H_{6.5}$). This ability makes farmers with much product knowledge less vulnerable to prejudiced elements of commercial information. These farmers have a smaller chance to be misled by commercial information sources. Finally, quality-conscious farmers probably have a higher need for an unbiased judgement concerning the quality level of the various alternatives than other farmers ($H_{6.6}$). For this reason, the former farmers may use to a larger extent non-commercial information sources.

The hypotheses on the contribution of the various types of information sources are summarized in table 8.3.

Table 8.3 *Overview of the hypotheses on the contribution of various types of information sources towards the total information acquisition*

Explanatory variables	Information sources	
	Impersonal vs. personal	*Commercial vs. non-commercial*
Product-related characteristics		
• type of product: service	–	
• market penetration	–	
• purchase complexity		–
• product importance		–
Individual characteristics		
• buying experience		+
• product involvement	+	+
• quality-consciousness		–
Type of relationship with vendor		
• existence personal relationship		+

8.3 INFORMATION SOURCES FOR BUYING EQUIPMENT AND CONTRACTING A FINANCIAL LOAN

In this section, the results of the analyses will be presented regarding how many different types of information sources farmers use in order to buy equipment or to contract a financial loan. An overview for various types of farmers will be given in section 8.3.1 of the number of information sources used when buying different types of equipment or contracting a financial loan. The results of the path analysis will be presented in the same section. The results regarding the contribution of information sources will be discussed in section 8.3.2.

8.3.1 The number of information sources used in buying decisions

To get an impression about the empirical findings, the average number of information sources used for buying different types of equipment or contracting a financial loan are presented for the various types of farming first (see table 8.4).

Table 8.4 *The average number of information sources used for buying equipment or contracting a financial loan for the various types of farming*

Types of input	Types of farming: Arable farming		Dairy farming		Pig farming		Greenhouse market gardening	
Equipment:	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
• Tractor	3.78 (n = 81)	.25	3.35 (n = 93)	.19				
• Fertilizer-spreader	4.30 (n = 63)	.28	3.27 (n = 70)	.25				
• Process-automation systems:								
- Climate-computer					4.43 (n = 65)	.26	4.33 (n = 36)	.30
- Hydroponics-computer							4.47 (n = 34)	.40
- Feeding-computer			4.92 (n = 62)	.23	5.65 (n = 17)	.43		
Service:								
• Financial loan > Dfl 50,000	3.13 (n = 63)	.23	3.01 (n = 84)	.19	3.16 (n = 83)	.21	3.53 (n = 58)	.30

S.E. = standard error of the mean

Table 8.4 indicates that most information sources are used for buying process-automation systems. Furthermore, arable farmers tend to use more information sources for buying tractors and fertilizer-spreaders than dairy farmers. According to the results with respect to the extensiveness of the buying process, the smallest number of information sources are used for contracting a loan of more than Dfl 50,000.

Hypothesis ($H_{1.1}$) that fewer information sources are used for buying services than for buying tangible goods was tested by a multivariate analysis of covariances (MANCOVA). Type of product (2 categories: financial loan versus equipment) and type of farming (4 categories) were the independent variables. Other related variables, like buying experience, product involvement, quality-consciousness, market orientation, and existence of personal relationship with vendor (see table 8.1) were used as covariates. Variation in the number of information sources used, which was associated with one or more covariates, was removed before carrying out an analysis of variance of the adjusted dependent variable. The MANCOVA results yield a significant main effect for type of product, $F_{1,771} = 31.60$ ($p < .01$), a non-significant ($\alpha = .05$) main effect for type of farming, $F_{3,771} = 2.30$ ($p = .076$), and a non-significant interaction effect, $F_{3,771} = .81$ ($p = .487$). All covariates show a

significant effect on the number of information sources used ($\alpha = .05$). In agreement with hypothesis $H_{1.1}$, we find that fewer information sources are used when contracting a financial loan (service) than in the case of buying equipment.

Path analysis

Four least-square regression analyses were performed to assess the parameters of the recursive system of equations presented in table 8.2. The path coefficients (β's) and the *t*-statistics of these equations are presented in table 8.5. The effect of the explanatory variables on the endogenous variables was tested one-tailed because a direction was hypothesized a priori. As discussed in chapter seven, we tested for heteroskedasticity by means of the tests suggested by White (1980) and Ramsey (1967) and, in case of heteroskedasticity, we corrected the estimator of the covariance matrix of the least square estimates by a procedure as proposed by White (1980).

Table 8.5 shows that, although fewer variables have a significant effect on the number of information sources used than on the extensiveness of the buying process, the explained variance ($R^2 = .209$) is almost the same. The measure of goodness of fit, Q, for testing overidentified models (see section 6.2) is .916. The result of the significance test for Q is: $W = 42.2$ ($N = 501$ and $d = 20$), $p < .01$. The fit of the overidentified model is rejected on grounds of the test of statistical significance. However, we accept the proposed model as an adequate fit to the data, since Q is very close to one and the significance test is affected by the sample size.

Product involvement (*PRODINV*) has the highest effect (+.297) on the width of information acquisition. This finding supports hypothesis $H_{3.2}$ that farmers with much product involvement and consequently high levels of ongoing search consult more information sources than other farmers. The influence of market penetration of the product (*MARKPEN*) on the width of information acquisition is also significant (−.185). Thus, hypothesis $H_{1.2}$ that increasing market penetration decreases the use of information sources is empirically supported. As hypothesized, the use of information sources decreases with growing buying experience (*BUYEXP*, −.131) and increases with greater purchase complexity ($COMP_{eq}$, +.108).

Table 8.5 *Path analysis results for buying equipment with the number of information sources used as the focal variable (direct effects, β-coefficients)*

Explanatory variables	Endogenous variables: *Number of information sources used* ($NUMINF_{eq/t}$)	Personal relationship (*RELVEN*)	Purchase complexity ($COMP_{eq}$)	Buying experience (*BUYEXP*)
Product-related characteristics				
market penetration (*MARKPEN*)	-.185 (-2.93)**	.025 (.46)	-.292 (-5.95)**	.481 (12.76)**
purchase complexity ($COMP_{eq}$)	.108 (2.08)*	.159 (3.09)**		
product importance:				
- financial ($IMPOR1_{eq}$)	.014 (.30)	-.057 (-1.19)	.343 (8.80)**	
- end-product ($IMPOR2_{eq}$)	.042 (.91)	.101 (2.21)*	.011 (.28)	
- prod. process ($IMPOR3_{eq}$)	-.007 (-.16)	.007 (.14)	.098 (2.30)*	
Farm enterprise characteristics				
type of farming compared to pig farming:				
- arable farming (*TYPEAF*)	.056 (.78)			
- dairy farming (*TYPEDF*)	.037 (.59)			
- greenh. mark. gard. (*TYPEMG*)	-.084 (-1.53)			
Individual characteristics				
buying experience (*BUYEXP*)	-.131 (-3.37)**		-.093 (-2.06)*	
product involvement (*PRODINV*)	.297 (6.58)**		.094 (2.45)**	
quality-consciousn. (*QUALCON*)	.033 (.76)	.213 (4.87)**	-.039 (-1.01)	
market orientation (*MARKOR*)	.087 (1.94)*			
age (*AGE*)		.112 (2.54)**	-.014 (-.35)	.216 (5.72)**
Relationship with vendor				
personal relationship (*RELVEN*)	-.047 (-1.09)			
	R^2 = .209	R^2 = .089	R^2 = .311	R^2 = .297
	$F_{13,487}$ = 9.92**	$F_{7,493}$ = 6.84**	$F_{8,492}$ = 27.75**	$F_{2,498}$ = 105.04**
	n = 501	n = 501	n = 501	n = 501

t statistics are in parentheses; the *t*-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
** significant at $p < .01$
* significant at $p < .05$

The proposed effects of product importance ($H_{1.4}$), quality-consciousness ($H_{3.3}$), market orientation ($H_{3.4}$), education level ($H_{3.5}$) and personal relationship with supplier (H_4) on the number of information sources used are not significant.
In addition, the width of information acquisition does not significantly differ for the various types of farmers (hypothesis H_2).

In agreement with the hypotheses, table 8.5 also shows that a personal relationship with the chosen vendor is significantly influenced by the quality-consciousness of the farmer (+.213), the purchase complexity (+.159), age (+.112), and the end-product importance (+.101). Purchase complexity is significantly affected by financial importance of the product (+.343), market penetration (−.292), production-process importance (+.098), product involvement (+.094), and buying experience (−.093). The hypothesized effect of end-product importance, quality-consciousness, and age on purchase complexity is not significant. Finally, as expected, market penetration of the product (+.481) and age of the farmer (+.216) affect buying experience significantly.

In addition to the direct effect, many variables have an indirect effect on the number of information sources used. Table 8.6 presents the total effect (i.e. the sum of the direct and indirect effects) on the number of information sources used. Most of the indirect effects are very small. Only the indirect effect of market penetration is substantially negative via a personal relationship with the vendor, purchase complexity, and buying experience.

Table 8.6 *Decomposition of the effects on the number of information sources used for buying equipment*

	Total effect	Direct effect	Indirect effect
Product-related characteristics			
market penetration (*MARKPEN*)	-.283	-.185	-.098
purchase complexity ($COMP_{eq}$)	.101	.108	-.007
product importance:			
- financial ($IMPOR1_{eq}$)	.051	.014	.037
- end-product ($IMPOR2_{eq}$)	.026	.042	-.016
- prod. process ($IMPOR3_{eq}$)	.003	-.007	.010
Farm enterprise characteristics			
type of farming compared to pig farming:			
- arable farming (*TYPEAF*)	.056	.056	——
- dairy farming (*TYPEDF*)	.037	.037	——
- greenh. mark. gard. (*TYPEMG*)	-.084	-.084	——
Individual characteristics			
buying experience (*BUYEXP*)	-.140	-.131	-.009
product involvement (*PRODINV*)	.306	.297	.009
quality-consciousn. (*QUALCON*)	-.047	.033	-.014
market orientation (*MARKOR*)	.087	.087	——
age (*AGE*)	-.037	——	-.037
Relationship with vendor			
personal relationship (*RELVEN*)	-.049	-.049	——

8.3.2 The contribution of information sources

In the questionnaire, the interviewed farmer had to indicate the importance of information originating from an information source used to buy an input on a five-point scale, i.e. 1 = not important to 5 = very important. The contribution of a particular information source ($\%I_i$) towards the total information acquisition was calculated in the following way: $\%I_i = I_i / \Sigma I_i * 100\%$, where I_i = the stated importance (range: 1 = unimportant to 5 = very important) if an information source had been used or $I_i = 0$ when the information source was not used. Thus, the total amount of information acquisition is 100% for each farmer.
The information sources being included in the questionnaire are presented in table 8.1. Each specific information source belongs to one of the four general types of information sources. In this section, we report on the individual contribution of the four general types of information sources towards the information acquisition (see table 8.7). More data about the contribution of the specific information sources are presented in Appendix III.1.

Table 8.7 *The contribution of the various types of information sources towards the total information acquisition for different combinations of inputs/type of farming*

	Information sources			
	Personal Non-commercial	*Personal Commercial*	*Impersonal Non-commercial*	*Impersonal Commercial*
Tractors				
• arable farmers	23.3%	44.8%	13.7%	18.2%
• dairy farmers	25.8%	52.5%	7.5%	14.2%
Fertilizer-spreader				
• arable farmers	25.0%	38.9%	17.7%	18.4%
• dairy farmers	23.1%	43.7%	14.2%	19.0%
Process-automation systems				
• dairy farmers	30.5%	37.7%	14.8%	17.0%
• pig farmers	37.7%	37.9%	10.3%	14.1%
• greenh. market gardeners	37.6%	37.8%	13.8%	10.8%
Financial loan > Dfl 50,000				
• arable farmers	47.1%	40.6%	8.4%	4.0%
• dairy farmers	50.7%	41.0%	5.8%	2.6%
• pig farmers	51.3%	41.1%	5.1%	2.6%
• greenh. market gardeners	52.0%	38.7%	6.9%	2.5%

Table 8.7 indicates that farmers heavily rely on personal information sources (63.1% to 92.4%). As expected, the contribution of personal information sources is higher

for contracting a financial loan than for buying tangible goods. The ratio of commercial to non-commercial personal information sources depends on the product bought. In the case of contracting a financial loan, the personal non-commercial information sources have the highest contribution towards the total information acquisition. If farmers buy traditional products (e.g. tractors and fertilizer-spreaders), the contribution of commercial personal information sources towards the total information acquisition is higher than that of other personal information sources. Finally, the contribution of both types of personal information sources are equivalent when buying innovative products (e.g. process-automation systems).

The hypothesis ($H_{5.1}$) that farmers rely more heavily on personal information sources when buying services than for tangible goods was tested by two multivariate analyses of variance (MANCOVA's) with commercial and non-commercial personal information sources as respective dependent variables. In these analyses, type of product (2 categories: financial loan versus equipment) and type of farming (4 categories) were the independent nominal variables. Other related variables, like buying experience, product involvement, quality-consciousness, and the presence of a personal relationship with vendor (see table 8.3), were used as covariates. Variation in the dependent variable with one or more covariates was removed before carrying out the analysis of variance of the adjusted variable. The MANCOVA results are presented in table 8.8.

Table 8.8 *Overview of the MANCOVA results concerning the contribution of personal information sources*

Dependent variable	Main effects		Interaction
	Type of product	*Type of farming*	
Personal information sources:			
• non-commercial	$F_{1,753} = 106.46$ ($p < .01$)	$F_{3,753} = 5.86$ ($p < .01$)	$F_{3,753} = 1.32$ ($p = .27$)
• commercial	$F_{1,753} = 5.20$ ($p = .02$)	$F_{3,753} = .53$ ($p = .66$)	$F_{3,753} = .27$ ($p = .85$)

According to hypothesis $H_{5.1}$, farmers rely more heavily on personal information sources for contracting a financial loan than for buying equipment. In particular, the contribution of non-commercial personal information sources is much higher in the case of contracting a financial loan. In addition, the contribution of non-commercial personal information sources was significantly ($\alpha = .05$) influenced by buying experience and by a personal relationship with the vendor. The contribution of

commercial personal information sources was significantly influenced by buying experience and by product involvement.

Regression analysis

The results of the regression analyses (β-coefficients and the t-statistics) are presented in table 8.9. The effect of independent variables on the dependent variable was tested one-tailed since a direction was hypothesized a priori. We tested for heteroskedasticity by means of the tests suggested by White (1980) and Ramsey (1967) and, in case of heteroskedasticity, we corrected the estimator of the covariance matrix of the least square estimates by a procedure as proposed by White (1980).

As expected ($H_{5.3}$), product involvement (*PRODINV*) has a significant, positive effect (+.301) on the contribution of impersonal information sources. This finding confirms that farmers with much product knowledge caused by ongoing search feel more competent to use impersonal information sources than other farmers. Contrary to hypothesis $H_{5.2}$, the contribution of impersonal information sources increased when a product goes through its life cycle (*MARKPEN*, +.098). Apparently, farmers tend to rely on personal information sources when buying innovative products.

Buying experience (*BUYEXP*) is an important variable in explaining the contribution of commercial information sources towards the total information acquisition. As hypothesized in $H_{6.4}$, farmers tend to rely more heavily on commercial information sources when they have more buying experience. Furthermore, in agreement with hypothesis $H_{6.3}$, the product importance in relation to the continuation of the production process ($IMPOR3_{eq}$) negatively influences the contribution of commercial information sources. Finally, quality-consciousness of farmers (*QUALCON*) has a significant negative effect on the contribution of commercial information sources. This finding supports hypothesis $H_{6.6}$ that quality-conscious farmers want more unbiased information in order to judge the quality level of the various alternatives than other farmers. The hypothesized effects of a personal relationship with the supplier ($H_{6.1}$), purchase complexity ($H_{6.2}$), financial importance ($H_{6.3}$), end-product importance ($H_{6.3}$), and product involvement ($H_{6.5}$) are not significant.

Table 8.9 *Results of regression analyses explaining the contribution of information sources towards the total information acquisition for buying equipment*

Explanatory variables	Contribution of	
	Impersonal sources	*Commercial sources*
Product-related characteristics		
market penetration (*MARKPEN*)	.098 (2.36)**	
purchase complexity ($COMP_{eq}$)		-.012 (-.20)
product importance:		
- financial ($IMPOR1_{eq}$)		-.006 (-.12)
- end-product ($IMPOR2_{eq}$)		.049 (1.10)
- production process ($IMPOR3_{eq}$)		-.121 (-2.50)**
Individual characteristics		
buying experience (*BUYEXP*)		.179 (3.40)**
product involvement (*PRODINV*)	.301 (7.22)**	-.019 (-0.40)
quality-consciousness (*QUALCON*)		-.099 (-2.05)*
Type of relationship with vendor		
personal relationship (*RELVEN*)		.036 (.67)
	R^2 = .096	R^2 = .083
	$F_{2,472}$ = 25.19**	$F_{8,466}$ = 5.28**
	n = 475	n = 475

t-statistics are in parentheses; the *t*-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
** significant at $p < .01$
* significant at $p < .05$

8.4 INFORMATION SOURCES FOR BUYING MATERIALS

In this section, the results of the analyses will be presented regarding how many different types of information sources farmers use in order to buy materials. An overview will be given in section 8.4.1 of the number of information sources used when buying different types of materials for different types of farmers. The results of the path analysis will be presented in the same section. The results regarding the contribution of information sources will be discussed in section 8.4.2.

8.4.1 The number of information sources used

Table 8.10 reports the number of information sources used in buying materials. This table indicates that the highest number of information sources are used for buying crop protection products. Obviously, these products have the highest information requirements. Furthermore, farmers use about the same number of information sources for buying compound feed and fertilizer.

Table 8.10 *Number of information sources used in buying materials for different types of farming*

Types of materials	Types of farming							
	Arable farming		Dairy farming		Pig farming		Greenhouse market gardening	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
• Compound feed			3.54 (n = 170)	.13	3.73 (n = 182)	.16		
• Fertilizer	3.04 (n = 83)	.20	3.39 (n = 147)	.15			3.72 (n = 71)	.23
• Crop protection products	5.33 (n = 97)	.18					5.07 (n = 58)	.24

S.E. = standard error of the mean

Some specific hypotheses on buying materials

Due to specific characteristics of materials, some modifications have been made regarding the set of hypotheses discussed in section 8.2.1. We discuss these modifications very briefly, since the arguments have been discussed in section 7.4.2. First, in our study the product-related characteristic 'market penetration' is not used as variable for buying materials. Second, age is the indicator for buying experience with respect to buying materials. Third, as a result of his delegation of buying activities, the farmer, being a member of a farm purchasing cooperative, may buy materials with minimal cognitive efforts. For this reason, it is expected that farmers who buy materials from farm purchasing cooperatives use fewer information sources than other farmers. The hypotheses on the number of information sources used for buying materials are summarized in table 8.11.

Table 8.11 *Summary of the hypothesized relationships between the number of information sources used and a number of explanatory variables in buying materials*

Explanatory variables	Endogenous variables		
	Number of information sources used	Personal relationship	Purchase complexity
Product-related characteristics			
• purchase complexity	+	+	
• product importance	+	+	+
Farm enterprise characteristics			
type of farming compared to pig farming:			
• arable farming	+		
• dairy farming	+		
• greenhouse market gardening	+		
Individual characteristics			
• product involvement	+		
• quality-consciousness	+	+	+
• output-market orientation	+		+
• age	−		−
Type of relationship with vendor			
• personal relationship	−		
• type of supplier: cooperative	−		

Path analysis

Three regression analyses were performed to assess the parameters of the recursive system of equations as presented in table 8.11. The path coefficients (and the *t*-statistics) of these equations are presented in table 8.12. The effect of the explanatory variables on the endogenous variables was tested one-tailed because a direction was hypothesized a priori. In case of heteroskedasticity, we corrected the estimator of the covariance matrix of the least square estimates by a procedure as proposed by White (1980).

Table 8.12 shows that few explanatory variables have a significant effect on the number of information sources used in buying materials. R^2 for the first equation is .246. The measure of goodness of fit, Q, for testing overidentified models is .947. The result of the significance test for Q is: $W = 42.0$ ($N = 785$ and $d = 11$), $p < .01$. The fit of the overidentified model is rejected on grounds of the test of statistical significance. However, we accept the proposed model as an adequate fit to the

data, since Q is very close to one and the significance test is affected by the sample size.

Table 8.12 *Path analysis results for buying materials (direct effects, β-coefficients)*

Explanatory variables	Endogenous variables: *Number of information sources used* (*NUMINF$_{mat}$*)	Personal relationship (*RELVEN*)	Purchase complexity (*COMP$_{mat}$*)
Product-related characteristics			
purchase complexity (*COMP$_{mat}$*)	.209 (5.86)**	.144 (3.98)**	
product importance:			
- financial (*IMPOR1$_{mat}$*)	-.050 (-1.20)	.076 (2.14)*	.283 (8.54)**
- end-product (*IMPOR2$_{mat}$*)	.042 (1.27)	-.077 (-2.28)*	.078 (2.38)**
Farm enterprise characteristics			
type of farming compared to pig farming:			
- arable farming (*TYPEAF*)	.070 (1.56)		
- dairy farming (*TYPEDF*)	-.030 (-.59)		
- greenh. mark. gard. (*TYPEMG*)	.047 (.92)		
Individual characteristics			
product involvement (*PRODINV*)	.315 (9.02)**		.171 (5.10)**
quality-consciousn. (*QUALCON*)	-.048 (-1.37)	.301 (8.84)**	.166 (4.94)**
market orientation (*MARKOR*)	.097 (2.73)**		
age (*AGE*)	-.120 (-3.43)**	.135 (4.03)**	-.107 (-3.29)**
Relationship with vendor			
personal relationship (*RELVEN*)	-.012 (-.33)		
type of supplier: cooperative (*COOP*)	-.012 (-.36)		
	R^2 = .246	R^2 = .150	R^2 = .190
	$F_{12,772}$ = 20.98**	$F_{5,779}$ = 27.55**	$F_{5,779}$ = 36.55**
	n = 785	n = 785	n = 785

t-statistics are in parentheses; the *t*-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
** significant at $p < .01$
* significant at $p < .05$

Product involvement (*PRODINV*) has a significant, positive coefficient (+.315) implying that farmers with high levels of ongoing search consult more information sources than farmers with less ongoing search activity ($H_{3.2}$). Moreover, in agreement with hypothesis $H_{1.3}$, the number of information sources used increases with purchase complexity (*COMP$_{mat}$*, +.209). The significant negative coefficient associated with *AGE* (−.120) indicates that more experienced farmers tend to use fewer information sources. This finding supports hypothesis $H_{3.1}$. Finally, market

orientation (*MARKOR*) has a significant positive effect on the number of information sources used (+.097). This finding is supporting hypothesis ($H_{3.4}$) that market-oriented farmers use more information sources than other farmers.
Other explanatory variables do not influence the number of information sources used for buying materials. Hypothesis H_2 is not supported since the differences between the various types of farming (*TYPEAF*, *TYPEDF*, *TYPEGH*) are not significant. Furthermore, the hypothesized negative effect of a personal relationship with the vendor (*RELVEND*, hypothesis H_4) and the effect of buying from farm purchasing cooperatives (*COOP*) on the width of information acquisition are not significant either. In this respect, it should be kept in mind that the width of information acquisition, i.e. the number of information sources consulted, gives no insight in the the intensity of using the respective information source. Another remarkable result is that the use of information sources was not significantly influenced by the importance of the product ($IMPOR1_{mat}$ and $IMPOR2_{mat}$, hypothesis $H_{1.4}$). Finally, the effect of quality-consciousness (*QUALCON*, $H_{3.3}$) on the number of information sources used is not significant.
In agreement with the hypotheses, table 8.12 also shows that a personal relationship with the current vendor is significantly influenced by the quality-consciousness of the farmer (+.301), purchase complexity (+.144), age (+.135), financial importance (+.076), and end-product importance (−.077). Although the first four effects are expected, the direction of the last relationship is not hypothesized. Thus, farmers pursue a less personal relationship with their vendor when buying products with high end-product importance. Apparently, farmers prefer flexibility in choosing vendors with respect to these products. As hypothesized, purchase complexity is significantly affected by financial importance of the product (+.283), product involvement (+.171), quality-consciousness (+.166), age (−.107), and end-product importance (+.078).

Besides direct effects, many variables have an indirect effect on the number of information sources used. Table 8.13 presents the total effect of the explanatory variables on the number of information sources used. The indirect effects are very small. Thus, the interpretation of the total effects corresponds with the interpretation of the direct effects.

Table 8.13 *Decomposition of the effects on the number of information sources used for buying materials*

	Total effect	Direct effect	Indirect effect
Product-related characteristics			
purchase complexity (*COMP$_{mat}$*)	.207	.209	-.002
product importance:			
- financial (*IMPOR1$_{mat}$*)	.008	-.050	.058
- end-product (*IMPOR2$_{mat}$*)	.058	.042	.017
Farm enterprise characteristics			
type of farming compared to pig farming:			
- arable farming (*TYPEAF*)	.070	.070	------
- dairy farming (*TYPEDF*)	-.030	-.030	------
- greenh. mark. gard. (*TYPEMG*)	.047	.047	------
Individual characteristics			
product involvement (*PRODINV*)	.350	.315	.035
quality-consciousn. (*QUALCON*)	-.017	-.048	.031
market orientation (*MARKOR*)	.097	.097	------
age (*AGE*)	-.143	-.120	-.023
Relationship with vendor			
personal relationship (*RELVEN*)	-.012	-.012	------
type of supplier: cooperative (*COOP*)	-.012	-.012	------

8.4.2 The contribution of information sources

In the questionnaire, the interviewed farmer had to indicate the importance of information originating from an information source used to buy an input on a five-point scale, i.e. 1 = not important to 5 = very important. The contribution of a particular information source (%I_i) towards the total information acquisition was calculated in the following way: $\%I_i = I_i / \Sigma I_i * 100\%$, where I_i = the stated importance (range: 1 = unimportant to 5 = very important) if an information source had been used or $I_i = 0$ when the information source was not used. Thus, the total amount of information acquisition is 100% for each farmer.

The information sources listed in the questionnaire are presented in table 8.1. Each specific information source belongs to one of the four general types of information sources. In this section, we report on the individual contribution of the four general types of information sources towards the information acquisition (see table 8.14). More information about the contribution of the specific information sources is presented in Appendix III.2.

Table 8.14 *The contribution of the various types of information sources towards the total information acquisition for different combinations of materials/type of farming*

	Information sources			
	Personal Non-commercial	*Personal Commercial*	*Impersonal Non-commercial*	*Impersonal Commercial*
Compound feed				
• dairy farmers	16.7%	44.2%	18.9%	20.2%
• pig farmers	23.7%	50.5%	13.6%	12.2%
Fertilizer				
• arable farmers	21.9%	35.6%	26.7%	15.8%
• dairy farmers	18.1%	38.7%	23.3%	19.9%
• greenh. market gardeners	51.0%	29.3%	12.6%	7.1%
Crop protection products				
• arable farmers	29.6%	33.7%	17.9%	18.8%
• greenh. market gardeners	50.5%	23.3%	13.9%	12.2%

Table 8.14 indicates that farmers heavily rely on personal information sources (56.8% to 80.3%). Similar results were found by Funk (1980; 1982), and Ford and Babb (1989). The high contribution of personal non-commercial information sources towards the total information acquisition for greenhouse market gardeners is remarkable. A possible explanation for this finding is the concentration of Dutch market gardeners in a small area. The extension service and study groups of farmers are well developed, and it is very easy to consult a colleague. Furthermore, study groups of market gardeners are more developed than in other agricultural sectors.
The highest contribution of personal commercial information sources to the total information acquisition is in the case of buying compound feed. This finding can be explained by the fact that many Dutch compound feed producers systematically use extension services in the marketing of their products

Regression analysis

The results of the regression analyses (β-coefficients and the t-statistics) are presented in table 8.15. The effect of independent variables on the dependent variable was tested one-tailed since a direction was hypothesized a priori. We tested for heteroskedasticity by means of the tests suggested by White (1980) and Ramsey (1967) and, in case of heteroskedasticity, we corrected the estimator of the covariance matrix of the least square estimates by a procedure as proposed by White (1980).

For reasons discussed earlier, market penetration and buying experience are omitted, but the type of supplier is added to the regression analysis explaining the contribution of different information sources for buying materials. Moreover, a dummy variable is added to the analysis which compares greenhouse market gardeners with other farmers because of the findings regarding the contribution of personal, non-commercial information sources.

Table 8.15 *Results of regression analyses explaining the contribution of information sources towards the total information acquisition for buying materials*

	Contribution of	
Explanatory variables	*Impersonal sources*	*Commercial sources*
Product-related characteristics		
purchase complexity ($COMP_{mat}$)		-.008 (-.21)
product importance:		
- financial ($IMPOR1_{mat}$)		.066 (1.52)
- end-product ($IMPOR2_{mat}$)		-.068 (-2.06)*
Farm enterprise characteristics		
greenh. market gardeners compared to other farmers (*TYPEMG*)	-.230 (-8.79)**	-.329 (-8.20)**
Individual characteristics		
product involvement (*PRODINV*)	.184 (4.81)**	-.080 (-2.00)*
quality-consciousness (*QUALCON*)		.054 (1.30)
age (*AGE*)		.061 (1.65)*
Type of relationship with vendor		
personal relationship (*RELVEN*)		.038 (.96)
type of supplier: cooperative (*COOP*)		-.056 (-1.59)
	R^2 = .087	R^2 = .150
	$F_{2,746}$ = 35.47**	$F_{9,739}$ = 14.53**
	n = 749	n = 749

t-statistics are in parentheses; the *t*-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
** significant at $p < .01$
* significant at $p < .05$

As expected ($H_{5.3}$), product involvement (*PRODINV*) has a significant, positive effect (+.184) on the contribution of impersonal information sources towards the total information acquisition. Thus, farmers with high levels of ongoing search as a result of product involvement use both personal and impersonal information sources, while other farmers rely more heavily on the opinions of other farmers and/or on other personal information sources. The two significant negative coefficients associated

with *TYPEMG* indicate that greenhouse market gardeners rely more on personal non-commercial information sources than other farmers. Personal non-commercial information sources are the most suitable information carriers in marketing materials to greenhouse market gardeners, because of an appropriate infrastructure (extension service and study groups are well developed) and the high number of Dutch greenhouse market gardeners in a small area.

Contrary to the expectations ($H_{6.5}$), product involvement (*PRODINV*) has a negative effect (−.080) on the contribution of commercial information sources. Thus, highly involved farmers with consequently high levels of ongoing search prefer unprejudiced information sources. With respect to buying materials, the contribution of commercial information sources is hardly influenced by variables related to perceived risk. Only, the end-product importance of the product ($IMPOR2_{mat}$) has a small negative effect (−.068) on the contribution of commercial information sources. Purchase complexity ($H_{6.2}$) and financial product importance ($H_{6.3}$) have no significant influence on the contribution of commercial information sources. In agreement with hypothesis $H_{6.4}$, older farmers with more buying experience use more commercial information sources.
Finally, the hypothesized effects of the personal relationship with the vendor ($H_{6.1}$), quality-consciousness ($H_{6.6}$), and type of supplier on the contribution of commercial information sources are not significant.

8.5 MAJOR FINDINGS AND CONCLUSIONS

This chapter focuses on the width of information acquisition (i.e. the number of information sources used) and the direction of external information search (i.e. the contribution of different information sources) when buying equipment, contracting a financial loan or buying materials.

Width of information search

The effect of the explanatory variables on the number of information sources used is summarized in table 8.16.

Table 8.16 *Summary of the effect of the explanatory variables on the number of information sources used*

	Number of information sources used
Product-related characteristics	
type of product: service	−
market penetration[1])	−−
purchase complexity	+/++[3])
product importance:	
- financial importance	n.s.
- end-product importance	n.s.
- production process importance[1])	n.s.
Farm enterprise characteristics	
type of farming compared to pig farming:	
- arable farming	n.s.
- dairy farming	n.s.
- greenhouse market gardening	n.s.
Individual characteristics	
buying experience (age)	−
product involvement	++
quality-consciousness	n.s.
market orientation	+
Relationship with vendor	
personal relationship	n.s.
type of supplier: cooperative[2])	n.s.

++ = strong positive influence, + = positive influence, n.s. = not significant, − = negative influence, −− = strong negative influence
[1]) Only equipment
[2]) Only materials
[3]) Different findings: equipment = before /; materials = after /

Our findings strongly support the "enrichment" hypothesis, that existing product knowledge facilitates the use of information sources. Farmers with relatively high levels of ongoing search tend to acquire information from more information sources. This effect occurs with respect to both equipment and materials.
Moreover, farmers also tend to simplify their buying process as a result of learning over time. Familiarity with products (i.e. products with a high market penetration) and with buying situations (much buying experience) result in the use of fewer information sources. Thus, buying knowledge obtained by much buying experience negatively affects the number of information sources used.
These findings suggest that the distinction between product knowledge and buying knowledge is important in order to understand the width of information acquisition of farmers regarding their buying decisions. Buying knowledge narrows the information acquisition, whilst product knowledge broadens this activity. For this reason,

propagating new products will be most successful with farmers having much product knowledge or showing much interest.
The variables related to perceived risk, i.e. purchase complexity and product importance, are not important determinants of the width of information acquisition. With respect to buying equipment, the influence of these variables is not significant or at least small. Only with respect to buying materials, farmers consult more information sources in order to reduce buying uncertainty.
Finally, the width of information acquisition in the case of buying (financial) services differs from buying equipment. Due to the difficulty in acquiring relevant information about services before purchase and utilization, farmers consult fewer information sources for buying (financial) services than for buying tangible goods (equipment).

Direction of external information search

The effect of the explanatory variables on the contribution of information sources is summarized in table 8.17.

An important determinant for the contribution of impersonal information sources towards the total information acquisition is the level of ongoing-search (product involvement). More product knowledge as a result of ongoing search facilitates the use of impersonal information sources. Less knowledgeable farmers tend to rely more heavily on the opinions of other persons, like colleagues and salespersons. Thus, impersonal communication media are more effective towards farmers with high levels of ongoing search. In addition, farmers rely more heavily on personal information sources when buying (financial) services than when buying tangible goods. Thus, personal communication channels are essential in marketing (financial) services to farmers.

The findings regarding the contribution of commercial information sources towards the total information acquisition differ for equipment and materials. With respect to *equipment*, the contribution of commercial information sources mainly depends on buying experience. Farmers rely more heavily on commercial information sources when they have more buying experience. Furthermore, the contribution of commercial information sources in case of buying equipment is influenced by production-process importance of the product (negative) and the quality-consciousness of the farmer (negative). Thus, in a high-risk buying situation caused by little buying experience, by high importance of the product related to the production process,

and/or by high quality consciousness respectively, farmers tend to rely on unprejudiced, i.e. non-commercial, information sources.

Table 8.17 *Summary of the effect of the explanatory variables on the contribution of information sources towards the total information acquisition*

	Contribution of	
	Impersonal sources	*Commercial sources*
Product-related characteristics		
market penetration[1])	+	
purchase complexity		n.s.
product importance:		
- financial importance		n.s.
- end-product importance		n.s./−[3])
- production process importance[1])		−
Farm enterprise characteristics		
greenh. market gardeners compared to other farmers[2])	−−	−−
Individual characteristics		
buying experience		++/+[3])
product involvement	++	n.s./−[3])
quality-consciousness		−/n.s.[3])
Type of relationship with vendor		
personal relationship		n.s.
type of supplier: cooperative[2])		n.s.

++ = strong positive influence, + = positive influence, n.s. = not significant, − = negative influence, −− = strong negative influence

[1]) Only equipment

[2]) Only materials

[3]) Different findings: equipment = before /; materials = after /

With respect to *materials*, the contribution of commercial information sources towards the total information acquisition is influenced by the level of ongoing search (negative). Farmers with high levels of ongoing search use many information sources, both commercial and non-commercial, while farmers with low levels of ongoing search tend to rely on fewer, mostly commercial information sources. Both types of farmers may use the same amount of commercial information sources, but the first farmer also uses other information sources which decreases the contribution of the commercial sources. Finally, greenhouse market gardeners mainly use personal non-commercial information sources, i.e. colleagues and extension services, in buying materials. This finding may be explained by the high concentration of Dutch market gardeners within a small area. Because of this concentration, the

extension service and study groups of market gardeners are well developed, and it is very easy to consult a colleague

CHAPTER NINE

TYPE OF DECISION MAKING AND SIZE OF THE BUYING CENTER

9.1 INTRODUCTION

The buying center includes all individuals that participate in the buying process and share the goals and the risks arising from it. A farm buying center may include farmers, spouses, other family members, and employees. The buying structure on farms is rather simple. Buying decisions on family farms are made individually or in small decision making units. Buying centers consisting of more than three members probably are exceptional, since the farmer is well informed about all aspects of the farm and because of the small size of the family farm. The type of decision making, i.e. joint versus autonomous decision making, is a basic issue when studying farm buying structures. If joint decision making occurs, the marketing activities of farm input suppliers may also be directed to other buying center members besides the farmer. In general, many farm input suppliers primarily direct their marketing activities to the farmer without having a clear insight in the buying structure on farms.

This chapter devotes attention to the determinants of joint decision making and to the size of the buying center. Based on the farmers' buying behavior model, a number of hypotheses concerning the effect of product-related characteristics, farm enterprise characteristics, and individual characteristics on both joint decision making and the size of the buying center are formulated in section 9.2. The data analysis procedures are also discussed in this section. In the sections 9.3 and 9.4, the results are discussed with respect to equipment/financial loan and materials. Finally, some major findings and conclusions are discussed in section 9.5.

9.2 HYPOTHESES AND DATA ANALYSIS PROCEDURES

9.2.1 Hypotheses

As discussed in chapter four, farm buying structures are influenced by buying task characteristics and buyer characteristics. The influence of these characteristics on both joint decision making and the size of the buying center is often in the same direction and for that reason discussed together, e.g. a large buying center means joint decision making and the smallest buying center shows autonomous decision making. The type of decision making is measured on a nominal scale only indicating whether or not the decision is made jointly. The size of the buying center is measured on a ratio scale indicating how many individuals are involved in the buying decision.
Our attention is focused on the influence of the following variables on both joint decision making and the size of the buying center: (1) product-related characteristics, i.e. services versus tangible goods, market penetration, purchase complexity, and product importance; (2) farm enterprise characteristics, i.e. participation of family members in the farm enterprise and the presence of employees; (3) individual characteristics, i.e. buying experience.

Product-related characteristics

$H_{1.1}$: *The buying center is larger in case of buying services as compared to buying tangible goods.*
In case of buying services, farmers experience much risk at the choice moment because of a lack of adequate buying information. Due to this prepurchase risk, we expect that farmers in the case of services may want to have more support from other family members in making the final decision than in the case of tangible goods.

$H_{1.2}$: *An increased market penetration of the product stimulates joint decision making and leads to larger buying centers.*
The market penetration of the product refers to the percentage of potential users who have adopted the product. Although contrary to the hypothesis proposed in the buying literature (see section 4.3.2), we expect that market penetration positively influences both joint decision making and the size of the buying center. In early stages of the product life cycle (PLC), the farmer's wife, relatives and employees are not able to contribute to the buying decision

and they leave the decision up to the farmer who is knowledgeable in the field (individual decision making). When buying a product in the maturity stage of its PLC, the final buying decision is more determined by less essential attributes, like shape, colour, status, brand name, of which other members of the farm family and/or employees besides the farmer may have an opinion. For this reason, these family members and/or employees are more involved in the buying decision, thus resulting in an increased joint decision making and larger buying centers.

$H_{1.3}$: *High purchase complexity leads to larger buying centers and to more joint decision making.*

Purchase complexity refers to the task uncertainty due to a perceived lack of relevant buying information. Reduction of this task uncertainty may be realized by more problem-solving capacity, i.e. larger buying centers and more joint decision making. The assistance of other family members and/or employees may be used for external search in order to make an accurate choice.

$H_{1.4}$: *Joint decision making and the size of the buying center are positively influenced by product importance.*

Product importance is the perceived significance of the buying decision in terms of the size of the purchase and/or the potential impact of the purchase on the functioning of the farm. It refers to the consequences of the buying decision, which are directly or indirectly experienced by the farm family and the employees. When these consequences increase, the members of the farm family and the employees are more motivated to get involved in the buying decision.

Farm enterprise characteristics

H_2: *Joint decision making and the size of the buying center are positively influenced by:*

a. the number of individuals who use the product;
b. the number of individuals working in the farm enterprise;
c. the number of farmers in the farm enterprise.

We expect that participation in farm operations and degree of responsibility for specific farm operations stimulate the participation in the buying process. In addition, we hypothesize that a strong drive to take part in the buying decision-making exists when a person is one of the owners (farmers) of the farm.

Individual characteristics

H_3: *Buying experience of the farmer is negatively related to joint decision making and to the size of the buying center.*
Buying experience is the number of times that a farmer has bought a particular product. A farmer with much buying experience has much confidence in his capacities to solve the buying problem. Probably, this confidence results in less need for problem solving capacity, i.e. more individual decision making and smaller buying centers. Farmers with little buying experience (e.g. first-time buyers) may have less confidence in the outcome of the buying process and may solve the buying problem by relying on others, including other family members.

A summary of the hypothesized relationships is presented in table 9.1.

Table 9.1 *Summary of the hypotheses concerning the influence of explanatory variables on both joint decision making and the buying center size*

	Joint decision making/ Size of the buying center
Product-related characetristics	
• type of product: service	+
• market penetration	+
• purchase complexity	+
• product importance	+
Farm enterprise characteristics	
• participation of family members and employees in the farm enterprise	
- number of users	+
- total number of individuals	+
- number of farmers	+
Individual characteristics	
• buying experience	−

9.2.2 Data analysis procedure

Multiple regression is used to establish the relationship between the size of the buying center and the explanatory variables. Since the dependent variable 'type of decision making' is dichotomous, multiple regression is no longer appropriate to establish the relationship between the type of decision making and the explanatory variables. In this situation a logistic regression model, i.e. logit analysis, is appro-

priate (Aldrich and Nelson 1984; Malhotra 1984; Hosmer and Lemeshow 1989). The logarithm of the odds ratio is assumed to be a linear function of the explanatory variables. The odds ratio of an event is defined as the ratio of the probability that it will occur to the probability that it will not. The logistic regression model takes the following functional form:

$$\ln\left[\frac{p}{1-p}\right] = \beta_0 + \beta_1 X_1 + ... + \beta_k X_k$$

where p corresponds with the probability of joint decision making. A maximum likelihood approach was used for parameter estimation (logit analysis).
For large samples, the test whether a coefficient is 0 can be based on the *Wald statistic*, which has a chi-square distribution with one degree of freedom. The Wald statistic is the square of the ratio of the coefficient to its standard error. In order to assess the partial contribution of an independent variable, the *r*-statistic is an adequate statistic which ranges in value from -1 to $+1$ (Norušis 1992).

9.3 THE BUYING STRUCTURE WITH RESPECT TO BUYING EQUIPMENT AND CONTRACTING A FINANCIAL LOAN

9.3.1 Introduction

The questionnaire measured the relative influence of all family members and employees by means of a 100-point constant sum scale. The interviewee was asked to give the influence of each buying center member in a specific stage of the decision process. We distinguished three stages in the buying process (see chapter 6): (1) information search/evaluation of alternatives; (2) final decision; (3) execution of the purchase. We did not take into account the stage 'problem recognition' because the buying problem was chosen as the starting point in our analysis (see section 4.2.1). Based on the information provided by the respondents, we derived the variables *type of decision making* ($TYPEDM_{eq(fi)}$) and *size of the buying center* ($SIZEBC_{eq(fi)}$). The type of decision making is a dichotomous variable including individual and joint decision making. A buying decision is classified as individual decision making if there is only one and the same buying center member in all three stages of the buying process. Joint decision making occurs in all other situations. The size of the buying center is the total number of buying center members involved in at least one stage of the buying process.

In order to evaluate our assumption that buying centers of more than three members is exceptional on farms, we first present a frequency table of the size of the buying center with respect to buying equipment and contracting a financial loan (table 9.2).

Table 9.2 *The size of the buying center with respect to buying equipment and contracting a financial loan*

Number of individuals	*Frequency*	*Percentage*	*Cumulative percentage*
1 individual	230	28.4%	28.4%
2 individuals	436	53.9%	82.3%
3 individuals	107	13.2%	95.5%
more than 3 individuals	36	4.5%	100.0%
	809	100.0%	

The results in table 9.2 confirm our expectation concerning the size of the buying center on farms. With respect to buying equipment and contracting a loan of more than Dfl 50,000, the buying center hardly exceeds three individuals. Buying centers consisting of two individuals occur most often.
In section 9.3.2, the size of the buying center and the percentage of individual decision making is compared for different types of equipment and for a financial loan contract. Since certain product-related variables (i.e. purchase complexity and product importance) were not operationalized with respect to contracting a financial loan of more than Dfl 50,000, size differences of the buying center between a service (financial loan) and tangible goods (equipment) were tested by a multivariate analysis of covariances (MANCOVA). In section 9.3.3, the logistic regression results (joint decision making) and multiple regression results (size of the buying center) for buying equipment are presented and discussed.

9.3.2 Comparison of the buying center size and the percentage of individual decision making.

Size of the buying center

To give a first impression of buying structures on farms, table 9.3 presents the average size of the buying center for the various types of farming and for the types of equipment or financial loans.

Table 9.3 *The average size of the buying center for the various types of farming and for the types of equipment or financial loan*

Types of input	Types of farming							
	Arable farming		Dairy farming		Pig farming		Greenhouse market gardening	
Equipment:	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
• Tractor	1.83 (n = 81)	.08	2.17 (n = 93)	.09				
• Fertilizer-spreader	1.57 (n = 63)	.08	1.76 (n = 70)	.11				
• Process-automation systems:								
- Climate-computer					2.03 (n = 65)	.09	1.75 (n = 36)	.13
- Hydroponics-computer							1.59 (n = 34)	.13
- Feeding-computer			1.94 (n = 62)	.08	1.76 (n = 17)	.11		
Service:								
• Financial loan > Dfl 50,000	2.13 (n = 63)	.09	2.10 (n = 84)	.08	2.08 (n = 83)	.09	2.05 (n = 58)	.12

S.E. = standard error of the mean

The results in table 9.3 do not show a clear relationship between a buying situation and the buying center size. The size of the buying center tends to differ more between than within the different types of farming. The buying centers on dairy farms are in general larger than on arable farms. Remarkably, buying innovative products does not cause large buying centers. These findings indicate that type of farming is an important determinant of farm buying structure. Therefore, this variable will be added to the analyses concerning the buying center.

Except for dairy farms, the largest buying centers occur with respect to contracting a financial loan of more than Dfl 50,000. The hypothesis ($H_{1.1}$) that the size of the buying center is larger with buying services than with buying goods was tested by a multivariate analysis of covariances (MANCOVA) applying the type of product (2 categories: financial loan versus equipment) and the type of farming (4 categories) as independent nominal variables. Other related variables, like the number of users, the total number of individuals working in the farm, the number of farmers, and buying experience (see table 9.1), were used as covariates. Variation in the buying center size, which was associated with one or more covariates, was removed before carrying out an analysis of variance of the adjusted dependent variable. The MANCOVA results yield a significant main effect for the type of product, $F_{1,797}$ =

16.94 ($p < .01$), a significant main effect for the type of farming, $F_{3,797} = 13.14$ ($p < .01$), and a significant interaction effect, $F_{3,797} = 3.16$ ($p = .024$). All covariates except buying experience show a significant effect on the size of the buying center ($\alpha = .05$). Since the interaction effect is significant, we also analyze the differences of buying center size between contracting a financial loan and buying equipment for each type of farming. The effect of the type of product is significant for arable farms ($F_{1,201} = 10.30$, $p < .01$) and greenhouse market gardens ($F_{1,122} = 6.93$, $p = .010$), and not significant for dairy farms ($F_{1,303} = 1.10$, $p = .295$) and pig farms ($F_{1,159} = .54$, $p = .46$).

These findings indicate that the size difference of buying center between services and tangible goods is rather small. Hypothesis $H_{1.1}$ that the size of the buying center is larger for buying services than for buying goods is only supported on arable farms and greenhouse market gardens.

Percentage of individual decision making

The degree of individual decision making in farmers' buying behavior is indicated in table 9.4.

Table 9.4 *Percentage of individual decision making in farmers' buying behavior for the various types of farming and for the types of equipment/financial loan*

Types of input	Types of farming			
	Arable farming	Dairy farming	Pig farming	Greenhouse market gardening
Equipment:				
• Tractor	34.6%	19.4%		
• Fertilizer-spreader	49.2%	42.9%		
• Process-automation systems:				
- Climate-computer			21.5%	41.7%
- Hydroponics-computer				55.9%
- Feeding-computer		22.6%	23.5%	
Service:				
• Financial loan > Dfl 50,000	12.7%	19.0%	21.7%	25.9%

Table 9.4 shows that individual decision making occurs most often on greenhouse market gardens. In general, more than one individual is involved in contracting a financial loan of more than Dfl 50,000. Furthermore, the differences between innovative and other products are small. Finally, there is a remarkable difference between arable and dairy farms with respect to buying a tractor. In buying a tractor,

arable farmers decide more often individually than dairy farmers. This difference between these two types of farmers is smaller in case of buying fertilizer-spreaders. Further analysis is necessary (see section 9.3.3) in order to explain these differences.

9.3.3 Test of hypotheses for equipment

Joint decision making

The whole sample is split into farms with joint decision making and farms with individual decision making. First, the differences of the explanatory variables between both groups of farms are analyzed with univariate F-tests (ANOVA). Next, the variables with significant differences are used in the logit analysis as an explanatory variable.

Table 9.5 *Means and univariate (ANOVA) F-tests of the explanatory variables for farms with joint decision making and for farms with individual decision making*

	Type of decision making			
	Total (n=521)	Individual (n=173)	Joint (n=348)	*F-test (df: 1,517)*
Product-related characteristics				
market penetration (*MARKPEN*)	3.93	4.00	3.89	*F = .72*
purchase complexity ($COMP_{eq}$)	56.74	54.67	57.75	*F = 4.73***
product importance:				
- financial ($IMPOR1_{eq}$)	13.09	11.72	13.77	*F = 15.06***
- end-product ($IMPOR2_{eq}$)	18.12	18.51	17.93	*F = 2.72*
- production process ($IMPOR3_{eq}$)	13.92	13.73	14.02	*F = .23*
Farm enterprise characteristics				
farm size (*SIZE*)	1.72	1.69	1.74	*F = .44*
participation family members and employees:				
- number of users (*#USER*)	1.72	1.39	1.89	*F = 57.44***
- total individuals (*#TOTIND*)	2.73	2.30	2.95	*F = 39.94***
- number of farmers (*#FARMER*)	1.32	1.09	1.43	*F = 50.49***
type of farming:				
- arable farming (*TYPEAF*)	27.6%	34.1%	24.4%	*F = 5.45***
- dairy farming (*TYPEDF*)	43.2%	35.8%	46.8%	*F = 5.74***
- pig farming (*TYPEPF*)	15.7%	10.4%	18.4%	*F = 5.60***
- greenh. mark. gard. (*TYPEMG*)	13.4%	19.7%	10.3%	*F = 8.72***
Individual characteristics				
buying experience (*BUYEXP*)	3.14	3.06	3.18	*F = .21*

** significant at $p < .05$
* significant at $p < .10$

Table 9.5 presents the means and univariate F-tests of the explanatory variables for both groups of farms and the whole sample. Farm size (*SIZE*) is added to the list of explanatory variables, since it is often mentioned in the buying behavior literature as an important determinant of joint decision making (see section 4.3.4). Based on earlier findings, type of farming is also added to the list of explanatory variables.
The type of decision making is not related to the market penetration of the product (*MARKPEN*), end-product importance ($IMPOR2_{eq}$), production process importance ($IMPOR3_{eq}$), farm size (*SIZE*) and buying experience (*BUYEXP*). Thus, hypothesis $H_{1.2}$ that an increased market penetration stimulates joint decision making is not empirically supported. Furthermore, contrary to hypothesis $H_{1.4}$, end-product importance and production process importance do not influence joint decision making. In addition, hypothesis H_3 that buying experience is negatively related to joint decision making is also not supported. Finally, in agreement with our expectation (see section 4.3.4), the economic size of the farm does not influence joint decision making.
The means of the other explanatory variables differ significantly with respect to joint and individual decision making. The type of decision making is in particular influenced by the participation of the family members and the employees in the farm enterprise. Logit analysis will be used to clarify the overall relationship between joint decision making and the significant explanatory variables (see table 9.6).

In order to identify the subset of variables that are good predictors of joint decision making, we used a stepwise procedure. Variables were removed from the model on the basis of the likelihood-ratio (LR) test. The change in the log likelihood is the criterion for elimination of a variable. We started with all of the variables in the model, variables were evaluated and removed in case of insufficient contribution to the model (backward elimination).
In order to assess the goodness of fit of the terms in the final model (after backward elimination), the $-2LL$ difference test was used to test the null hypothesis that the coefficients for all of the terms in the final model, except the constant, are 0. This difference test is significant ($p < .01$). The final model correctly classifies 78.4% of the cases. Based on the maximum change criterion (67%) and the proportional chance criterion (56%), the classification result of the final model is acceptable (Hair et al. 1987).
We will use the *r*-statistic in order to assess the influence of a variable on joint decision making, since this statistic reflects the partial contribution of a variable.

Table 9.6 *Results of logistic regression analysis explaining joint decision making (stepwise procedure, backward elimination)*

	Estimated coefficient (*b*)	Wald statistic	*r*-statistic
Product-related characteristics			
purchase complexity ($COMP_{eq}$)	not sign.	-----	-----
product importance:			
- financial ($IMPOR1_{eq}$)	.071	13.87**	.134
Farm enterprise characteristics			
participation family members and employees:			
- number of users (*#USER*)	.631	10.09**	.111
- total individuals (*#TOTIND*)	.503	9.22**	.105
- number of farmers (*#FARMER*)	1.244	16.03**	.146
type of farming compared to dairy farming:			
- arable farming (*TYPEAF*)	-.531	4.72*	-.064
- pig farming (*TYPEPF*)	not sign.	-----	-----
- greenhouse market gardening (*TYPEMG*)	-2.069	29.44**	-.204
Goodness of Fit of the Model			
−2 LL (model containing only constant)		657.89	
−2 LL (final model)		519.82	
−2 LL difference (χ^2, df = 6)		138.07**	
% correctly classified		78.4% n = 519	

** significant at $p < .01$
* significant at $p < .05$

Table 9.6 shows that farm enterprise characteristics strongly influence joint decision making in relation to buying equipment. As hypothesized (H_2), joint decision making is positively influenced by (in order of partial contribution): number of farmers (*#FARMER*, +.146), number of users (*#USER*, +.111), and total number of individuals working in the farm enterprise (*#TOTIND*, +.105). Individual decision making occurs more often on greenhouse market gardens (*TYPEMG*, −.204) and slightly more often on arable farms (*TYPEAF*, −.064) compared with dairy farms. An explanation of this finding may be that dairy farmers in managing the farm involve their spouses more than arable farmers and market gardeners. Furthermore, as expected in hypothesis $H_{1.4}$, joint decision making is positively influenced by the financial importance of a product ($IMPOR1_{eq}$, +.134). Thus, farmers tend to decide jointly in case of expensive products. Finally, hypothesis $H_{1.3}$ that high purchase complexity leads to joint decision making is not supported.

Size of the buying center

In order to identify the variables which significantly contributed to the variation in the size of the buying center, we used a stepwise procedure of backward elimination. We started with all possible explanatory variables in the equation and sequentially removed them on the basis of the significance of their partial *F*-value. The results of the regression analysis explaining the size of the buying center is presented in table 9.7.

Table 9.7 *Results of regression analysis explaining the size of the buying center (stepwise procedure, backward elimination)*

	regression coefficient (b)	standardized regression coefficient (β)	t-statistic
Product-related characteristics			
market penetration (*MARKPEN*)	.052	.094	1.79*
purchase complexity ($COMP_{eq}$)	not sign.	-----	-----
product importance:			
- financial ($IMPOR1_{eq}$)	.018	.136	3.65**
- end-product ($IMPOR2_{eq}$)	-.017	-.087	-2.13*
- production process ($IMPOR3_{eq}$)	not sign.	-----	-----
Farm enterprise characteristics			
farm size (*SIZE*)	not sign.	-----	-----
participation family members and employees:			
- number of users (*#USER*)	.306	.304	6.84**
- total individuals (*#TOTIND*)	.173	.261	4.95**
- number of farmers (*#FARMER*)	.195	.143	3.43**
type of farming compared to dairy farming:			
- arable farming (*TYPEAF*)	-.152	-.091	-2.16*
- pig farming (*TYPEPF*)	not sign.	-----	-----
- greenhouse market gardening (*TYPEGMG*)	-.510	-.232	-5.15**
Individual characteristics			
buying experience (*BUYEXP*)	-.023	-.088	-2.03*
		R^2 = .345 $F_{9,509}$ = 29.72 n = 519	

The t-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
** significant at $p < .01$ (one-tailed)
* significant at $p < .05$ (one-tailed)

Table 9.7 shows that a significant part of the total variance is explained by the proposed model: $R^2 = .345$. The variables related to the participation of family

members and employees in the farm enterprise are most influential on buying center size. Consistent with hypothesis H_2, the buying center size is positively influenced by (in order of importance): number of users (*#USER*, +.304), total number of individuals working in the farm enterprise (*#TOTIND*, +.261), and number of farmers (*#FARMER*, +.143). The influence of type of farming is also important. The buying center size is much smaller on greenhouse market gardens (*TYPEMG*, −.232) and slightly smaller on arable farms (*TYPEAF*, −.091) than on dairy farms. Furthermore, buying center size is also influenced by product-related characteristics. As proposed in hypothesis $H_{1.4}$, financial importance of the product ($IMPOR1_{eq}$, +.136) positively influences the size of the buying center. Contrary to the expectations ($H_{1.4}$), the buying center size is negatively influenced by the end-product importance of the product ($IMPOR2_{eq}$, −.087). Apparently, in case of buying products which are highly necessary in relation to the current structure of the farm, farmers tend to decide individually. Probably, this buying decision was delegated to the most knowledgeable individual on the farm. Hypothesis $H_{1.2}$ that an increased market penetration (*MARKPEN*, +.094) increases buying center size is supported. In early stages of the product life cycle, farmers' wives, other relatives and employees tend to leave the buying decision up to the farmer who is most knowledgeable in the field. The last significant variable is buying experience (*BUYEXP*). As hypothesized (H_3), buying experience is negatively related to the size of the buying center.
Some of the stated hypotheses concerning the buying center size are not supported. The hypothesized effects of both product complexity ($H_{1.3}$) and production process importance ($H_{1.4}$) on the size of the buying center are not significant. In addition, in agreement with our expectations (see section 4.3.4), the economic size of the farm does not influence the size of the buying center on farms as long as the farm production is organized within the context of family farms.

9.4 THE BUYING STRUCTURE WITH RESPECT TO BUYING MATERIALS

9.4.1 Introduction

With regard to materials, we distinguished two buying activities (stages) to which respondents could allocate 100 points among buying center members: (1) information search/evaluation of alternatives and (2) ordering the product. These two buying activities are performed whether or not the current supplier is reconsidered. If the current supplier was regularly reconsidered, the respondents were interviewed about

the influence of buying center members during the choice-making stage. However, only 25% of the respondents passed this criterion. Although many farmers did not reconsider their current supplier, we expected a higher percentage. The low percentage probably might also be caused by misunderstanding the question. For this reason, the choice-making stage concerning materials was left aside in the analysis of the type of decision making and the buying center size.

The *type of decision making* ($TYPEDM_{mat}$) was classified as follows: (i) individual decision making if one and the same buying center member was involved in both information search/evaluation of alternatives and ordering the product, and (ii) joint decision making in all other situations. The *size of the buying center* ($SIZEBC_{mat}$) was measured by the total number of individuals involved in one or both buying activities.

In order to evaluate our assumption that buying centers of more than three members is exceptional on farms, we present a frequency table of the size of the buying center with respect to buying materials (table 9.8).

Table 9.8 *The size of the buying center with respect to buying materials*

Number of individuals	*Frequency*	*Percentage*	*Cumulative percentage*
1 individual	439	54.4%	54.4%
2 individuals	304	37.7%	92.1%
3 individuals	55	6.8%	98.9%
more than 3 individuals	9	1.1%	100.0%
	807	100.0%	

The results in table 9.8 confirm our expectation concerning the size of the buying center with respect to buying materials. The buying center hardly exceeds three individuals. Remarkably, individual decision making occurs most often.

In section 9.4.1, the size of the buying center and the percentage of individual decision making is compared for different types of materials. Section 9.4.2 continues with the analysis of joint decision making by logistic regression and the analysis of the buying center size for materials by multiple regression.

9.4.2 Comparison of the buying center size and the percentage of individual decision making

Size of the buying center

Table 9.9 presents the average buying center size for various types of farming and types of materials.

Table 9.9 *The average buying center size for the various types of farming and types of materials*

Types of materials	Types of farming							
	Arable farming		Dairy farming		Pig farming		Greenhouse market gardening	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
• Compound feed			1.69 (n = 169)	.05	1.64 (n = 182)	.05		
• Fertilizer	1.37 (n = 83)	.06	1.48 (n = 147)	.05			1.56 (n = 71)	.09
• Crop protection products	1.34 (n = 97)	.06					1.62 (n = 58)	.12

S.E. = standard error of the mean

The results in table 9.9 do not show a clear relationship between a buying situation and the size of the buying center. The size of the buying center differs more between than within the different types of farming. The buying centers for fertilizer and crop protection products on greenhouse market gardens are larger than on arable farms. The buying centers for fertilizer on dairy farms are also larger than on arable farms. The difference between dairy farmers and pig farmers are not significant.

Percentage of individual decision making

The degree of individual decision making in farmers' purchasing is indicated in table 9.10.

Table 9.10 *Percentage of individual decision making in farmers' purchasing for the various types of farming and types of materials*

Types of materials	Types of farming			
	Arable farming	Dairy farming	Pig farming	Greenhouse market gardening
• Compound feed		40.8%	48.4%	
• Fertilizer	65.1%	59.2%		56.3%
• Crop protection products	69.1%			58.6%

Table 9.10 shows that individual decision making occurs most often on arable farms. Only with respect to buying compound feed, the percentage of joint decision making is higher than the percentage of individual decision making. A possible explanation for this finding may be that wives of dairy and pig farmers are traditionally more involved with the farm. With respect to fertilizer and crop protection products, for the greater part, only one person is responsible for the information search/evaluation of alternatives and for the ordering the product.

9.4.3 Test of hypotheses for materials

Joint decision making

The mean differences of the explanatory variables with respect to the two types of decision making are analyzed with univariate F-tests (see table 9.11). In agreement with the analysis concerning equipment/financial loan, farm size and type of farming are added to the list of explanatory variables.

Table 9.11 shows that the means of almost all explanatory variables are significantly different with respect to the two types of decision making. Only the percentage of greenhouse market gardens does not significantly differ between farms with individual decision making and farms with joint decision making. Especially, the differences of the means of the variables concerning the participation of family members and employees in the farm enterprise are remarkable. Logit analysis will be used for clarifying the overall relationship between joint decision making and the explanatory variables (see table 9.12).

Table 9.11 *Means and univariate (ANOVA) F-tests of the explanatory variables for joint and individual decision making*

	Total (n=807)	*Type of decision making* Individual (n=439)	Joint (n=368)	*F-test (df: 1,805)*
Product-related characteristics				
purchase complexity ($COMP_{mai}$)	42.32	41.57	43.21	$F = 2.70$*
product importance:				
- financial ($IMPOR1_{mai}$)	26.34	25.49	27.35	$F = 5.35$**
- end-product ($IMPOR2_{mai}$)	16.48	16.06	16.99	$F = 5.40$**
Farm enterprise characteristics				
farm size (*SIZE*)	1.73	1.65	1.83	$F = 10.58$**
participation family members and employees:				
- number of users (*#USER*)	1.75	1.41	2.15	$F = 257.85$**
- total individuals (*#TOTIND*)	2.78	2.50	3.12	$F = 61.28$**
- number of farmers (*#FARMER*)	1.32	1.14	1.54	$F = 130.03$**
type of farming:				
- arable farming (*TYPEAF*)	22.3%	27.6%	16.0%	$F = 15.74$**
- dairy farming (*TYPEDF*)	39.2%	35.5%	43.5%	$F = 5.32$**
- pig farming (*TYPEPF*)	22.6%	20.1%	25.5%	$F = 3.47$*
- greenh. market gard. (*TYPEMG*)	16.0%	16.9%	15.0%	$F = .54$
Individual characteristics				
age (*AGE*)	42.77	41.98	43.72	$F = 5.54$**

** significant at $p < .05$
* significant at $p < .10$

We used a stepwise procedure of backward elimination in order to reduce the final model containing only variables which significantly determine joint decision making. The variables were removed from the model on the basis of the LR test. The final model as a whole explains significantly more than the model containing only the constant (−2LL difference = 288.59, $p < .01$). The final model correctly classifies 76.2% of the cases. Based on the maximum chance criterion (54%) and the proportional chance criterion (50%), the classification result is good (Hair et al. 1987).

We use the *r*-statistic in order to assess the influence of a variable on joint decision making. Table 9.12 shows that two of the three variables related to the participation of the family members and the employees in the farm enterprise strongly determine joint decision making in relation to buying materials. In agreement with hypothesis H_2, the number of users (*#USER*, +.317) and number of farmers (*#FARMER*, +.195) positively influence joint decision making. Since the total number of individuals (*#TOTIND*) is highly correlated with the number of users (*#USER*) and

farmers (*#FARMER*), the influence of *#TOTIND* on joint decision making was not significant (multicollinearity). The influence of *#TOTIND* on buying center size is significant if *#USER* and *#FARMER* are removed.

Table 9.12 *Results of logistic regression analysis explaining joint decision making (stepwise procedure, backward elimination)*

	Estimated coefficient (*b*)	Wald statistic	*r*-statistic
Product-related characteristics			
purchase complexity ($COMP_{mat}$)	not sign.	—	—
product importance:			
- financial ($IMPOR1_{mat}$)	.019	6.12*	.061
- end-product ($IMPOR2_{mat}$)	not sign.	—	—
Farm enterprise characteristics			
farm size (*SIZE*)	not sign.	—	—
participation family members and employees:			
- number of users (*#USER*)	1.589	113.98**	.317
- total individuals (*#TOTIND*)	not sign.	—	—
- number of farmers (*#FARMER*)	1.217	44.35**	.195
type of farming compared to greenhouse market gardening:			
- arable farming (*TYPEAF*)	not sign.	—	—
- dairy farming (*TYPEDF*)	.363	4.12*	.044
- pig farming (*TYPEPF*)	not sign.	—	—
Individual characteristics			
age (*AGE*)	.018	4.70*	.049
Goodness of Fit of the Model			
−2 LL (model containing only constant)		1112.48	
−2 LL (final model)		823.90	
−2 LL difference (χ^2, df = 5)		288.59**	
% correctly classified		76.2%	
		n = 807	

** significant at $p < .01$
* significant at $p < .05$

Furthermore, as expected in hypothesis $H_{1.4}$, joint decision making is positively influenced by the financial importance of a product ($IMPOR1_{mat}$, +.061). The positive influence of age (*AGE*, +.049) on joint decision making is contrary to hypothesis H_3 that more buying experience leads to less joint decision making. When buying materials, older farmers probably often consult their (potential) successors. In addition, dairy farmers tend to decide more jointly than greenhouse market

gardeners. In agreement with our expectation (see section 4.3.4), the economic size of the farm (*SIZE*) does not influence joint decision making. Finally, the hypothesized effects of product complexity ($H_{1.3}$) and end-product importance ($H_{1.4}$) on joint decision making are not supported.

Size of the buying center

In order to identify the variables which significantly contributed to the variation in the size of the buying center, we used a stepwise procedure of backward elimination. The results of the regression analysis explaining the size of the buying center is presented in table 9.13.

Table 9.13 *Results of regression analysis explaining the size of the buying center (stepwise procedure, backward elimination)*

	regression coefficient (b)	standardized regression coefficient (β)	t-statistic
Product-related characteristics			
purchase complexity ($COMP_{max}$)	not sign.	——	——
product importance:			
- financial ($IMPOR1_{max}$)	not sign.	——	——
- end-product ($IMPOR2_{max}$)	not sign.	——	——
Farm enterprise characteristics			
farm size	not sign.	——	——
participation family members and employees:			
- number of users (*#USER*)	.460	.511	17.14**
- total individuals (*#TOTIND*)	not sign.	——	——
- number of farmers (*#FARMER*)	.260	.210	7.05**
type of farming compared to greenhouse market gardening:			
- arable farming (*TYPEAF*)	not sign.	——	——
- dairy farming (*TYPEDF*)	not sign.	——	——
- pig farming (*TYPEPF*)	not sign.	——	——
Individual characteristics			
age (*AGE*)	not sign.	——	——
		R^2 = .387	
		$F_{2,804}$ = 253.78**	
		n = 807	

The t-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
** significant at $p < .01$ (one-tailed)
* significant at $p < .05$ (one-tailed)

Table 9.13 shows that two variables explained about 39% of the total variance in the buying center size (R^2 = .387). Only the number of users (*#USER*) and the number of farmers (*#FARMER*) significantly influence the size of the buying center. In agreement with hypothesis H_2, both variables are positively related to buying center size (+.511 and +.210 respectively). Since the influence of the total number of individuals (*#TOTIND*) is highly correlated with the number of users (*#USER*) and farmers (*#FARMER*), the influence of *#TOTIND* on buying center size is not significant (multicollinearity). The influence of *#TOTIND* on buying center size is significant if *#USER* and *#FARMER* are removed.
All other explanatory variables are not significant. Thus, the hypothesized effects of product complexity ($H_{1.3}$), product importance (both financial and end-product, $H_{1.4}$), and buying experience (age, H_3) are not supported. Finally, consistent with the expectation (see section 4.3.4), the economic size of the farm (*SIZE*) has no impact on the size of the buying center.

9.5 MAJOR FINDINGS AND CONCLUSIONS

Our assumption that buying centers of more than three individuals are exceptional on Dutch farms is supported. In general, buying centers on Dutch farms consist of one or two persons. Table 9.14 presents a summary of the findings with respect to joint decision making and the size of the buying center.

Joint decision making
The type of decision making, i.e. joint versus individual decision making, is strongly determined by farm enterprise characteristics. Product-related characteristics and buying experience hardly influence joint decision making. Thus, the decision of a farm input supplier to focus marketing activities solely on farmers, should be based on a good understanding of farm enterprise characteristics. In particular, in case of a partnership (more than one farmer) and in case of multiple users, the chance of joint decision making is very high. With respect to equipment, the total number of individuals working in the farm is also relevant. Moreover, joint decision making occurs more often on dairy farms compared to arable farms and greenhouse market gardens. A possible explanation for this finding may be that wives of dairy farmers are traditionally more involved with the farm. Finally, joint decision making occurs more often when farmers buy financially important products.

Table 9.14 *Summary of the findings of the effect of the explanatory variables on joint decision making and buying center size*

	Joint decision making	Buying center size
Product-related characteristics		
type of product: service	-----	+
market penetration[1])	n.s.	+
purchase complexity	n.s.	n.s.
product importance:		
- financial importance	+	+/n.s.[1])
- end-product importance	n.s.	−/n.s.[1])
- production process importance[1])	n.s.	n.s.
Farm enterprise characteristics		
farm size	n.s.	n.s.
participation of family members and employees in the farm enterprise		
- number of users	+/++[2])	++
- total number of individuals	+/n.s.[2])	++/n.s.[1])
- number of farmers	++	++
type of farming compared to greenhouse market gardening:		
- arable farming	n.s.	n.s.
- dairy farming	++/+[2])	++/n.s.[1])
- pig farming	++/n.s.[2])	++/n.s.[1])
Individual characteristics		
buying experience	n.s./+[2])	−/n.s.[1])

++ = strong positive influence, + = positive influence, n.s. = not significant, − = negative influence, −− = strong negative influence

[1]) Only equipment

[2]) Different findings: equipment = before /; materials = after /.

Buying center size

The buying center size is also strongly determined by farm enterprise characteristics. Within the set of explanatory variables, the buying center size concerning materials significantly depends on both the number of users and the number of farmers. In addition to these two variables, the number of individuals working in the farm also affects the buying center size with respect to buying equipment. Thus, information about the participation of family members and employees in the farm enterprise is essential to predict the buying center size on farms.

Market penetration, financial importance of the product and type of farming are also relevant variables only with respect to buying equipment. In the case of contracting a financial loan, buying centers on farms are larger than in the case of buying equipment. Finally, contrary to buying centers in organizations, the buying center size is not influenced by the economic size of the farm.

CHAPTER TEN

INFLUENCE OF BUYING CENTER MEMBERS

10.1 INTRODUCTION

The last chapter clarified that many buying decisions on family farms are made individually or in small decision making units. Marketeers of farm inputs can use the buying center concept to identify the members of the buying center and the structure of their roles and influence. Amongst others, a clear understanding of the variations in the influence distribution within the buying center is needed for a 'fine tuning' of the marketing strategies of farm inputs.
This chapter deals with the influence of buying center members. We have attempted to identify the influence of farm members. Based on our model of farmers' buying behavior discussed in chapter four, a number of hypotheses are proposed in section 10.2 about the effect of explanatory variables on the influence of a buying center member. The data analysis procedures are discussed accordingly. In the sections 10.3 and 10.4, the results are discussed with respect to buying equipment/contracting a financial loan and buying materials. Finally, some major findings and conclusions are given in section 10.5.

10.2 HYPOTHESES AND DATA ANALYSIS PROCEDURE

As discussed in chapter four, a number of variables determine the influence of a buying center member. The effect of the following variables on the influence of a buying center member will be investigated in this chapter: (1) the amount of participation in farm operations, i.e. the amount of product use and the amount of working in the farm, (2) the position of an individual in the farm enterprise, and (3) number of farmers. The hypotheses are discussed briefly, since a more extensive explanation was presented in the sections 4.2.3 and 4.3.4.

The individual participation in farm operations

H_1: *The influence of a buying center member increases if:*
$H_{1.1}$: *s/he is making more use of the product in question;*
$H_{1.2}$: *s/he works more hours in the farm enterprise.*
Participation in farm operations and degree of responsibility for specific farm operations may stimulate participation in the buying process. Especially, if the individual is making much use of the product in question, his/her experience is important in buying the product. More generally, if the individual works more hours in the farm enterprise, s/he will perceive a higher responsibility for the whole farm operation. As a result of this, s/he may pursue higher involvement in buying decisions.

The individual position in the farm enterprise

H_2: *The influence of a buying center member depends on the individual position in the farm enterprise.*
The family members and employees working in the farm have certain attitudes and expectations of the roles of themselves and other persons in the farm. The individual position in the farm enterprise refers to this individual role in the farm (family), i.e. being a farmer or being a spouse or being a successor or being a child or being an employee. The individual position indicates the power of a family member or an employee in the farm enterprise and consequently his/her influence on buying decisions.
The influence on buying decisions differs depending on whether the individual is a farmer or an employee. In general, the farmer possesses reward/coercive, expert and legitimate power more than other farm family members and employees. For this reason, we expect that the influence of farmers on buying decisions is higher than the influence of other family members and employees. The influence of a successor, who is a child of the farmer without being a partner, may also be high because of the possession of expert and legitimate power, although it will be lower than the influence of farmers. In our study, if the successor is a partner in a father-son partnership, he is defined as a farmer (see chapter 5). The expert power of the successor refers to his specific agricultural education and his experience. Finally, a wife may also be very influential in the buying center on farms, because she also possesses reward/coercive, expert and legitimate power depending on her involvement in the farm operations.

Other explanatory variables

$H_{3.1}$: *'More farmers resulting from a partnership' decreases the influence of individual buying center members.*

In the case of a sole proprietorship, the farmer may use the opinions and assistance of other family members and/or employees in order to make the correct choice. In case of partnerships, the farmers decide together and there is less need for assistance from other family members and/or employees. Therefore, the influence of other family members and employees decreases when the number of farmers increases.

Furthermore, in case of partnerships, we expect that the farmers decide jointly when buying inputs. Consequently, the influence of the respective farmers in case of partnerships will be lower than the influence of the farmer in a sole proprietorship. The null hypothesis is not rejected by definition, since one of the partners may be solely responsible for buying a particular input.

$H_{3.2}$: *Age positively affects the influence of individual buying center members.*

We hypothesize that older individuals are used to take more responsibilities and tend to decide more on their own than younger individuals. This implies a positive relationship between the age of an individual and her/his influence on buying decisions.

Table 10.1 *Summary of the hypotheses concerning the effect of explanatory variables on the influence of a buying center member*

	Influence of a buying center member
The individual participation in the farm enterprise	
• product use	+
• number of hours of work	+
The individual position in the farm enterprise	
• the influence of an individual compared to a farmer:	
- spouse	−
- successor	−
- other family members	−
- employees	−
Other variables	
• number of farmers	−
• age	+

A summary of the hypothesized relationships is presented in table 10.1. The influence of a farmer is used as a point of reference in proposing the hypotheses on the individual position in the farm enterprise.

Data analysis procedure

In order to assess the influence of a farm member on buying-decision making, the respondent (farmer) was asked to distribute 100 points to the buying center members according to his perception of their influence in the decision process. Thus, the influence of a buying center member may vary from 0 to 100. We used multiple regression analysis to establish the effect of the explanatory variables on the influence of a buying center member. In order to identify the variables that significantly contributed to the influence of a buying center member, we used a stepwise procedure of backward elimination. We started with all possible explanatory variables, based on the proposed hypotheses, and sequentially removed them on the basis of being not significant to the influence of a buying center member.
We tested for heteroskedasticity by means of the tests suggested by White (1980) and Ramsey (1967) and we corrected the estimator of the covariance matrix of the least square estimates by a procedure as proposed by White (1980).

10.3 THE INFLUENCE OF A BUYING CENTER MEMBER WITH RESPECT TO BUYING EQUIPMENT AND CONTRACTING A FINANCIAL LOAN

In the questionnaire, the respondent was asked to indicate the influence of each buying center member in a specific stage of the decision process. We distinguished three stages in the buying process (see chapter 6): (1) information search/evaluation of alternatives, (2) final decision, and (3) execution of the purchase. We did not take into account the stage 'problem recognition' because the buying problem was chosen as the starting point in our analysis (see section 4.2.1). In section 10.3.1, the distribution of influence to the (potential) buying center members, e.g. farmers, spouses, and other family members/employees, in the three stages of the buying process is compared for buying different types of equipment and for contracting a financial loan. In section 10.3.2, the results of the multiple regression analyses in relation to buying equipment and contracting a financial loan are respectively presented and discussed.

10.3.1 Comparison of the influence allocation to the buying center members

As discussed in section 10.2, we expect that the distinction between sole proprietorship and partnership is important to understand the distribution of influence to the various buying center members. For this reason, we separately present the allocation of influence on farms with one farmer (table 10.2) and with two or more farmers (table 10.3).

Table 10.2 *The allocation of influence on farms with one farmer (sole proprietorship)*

Types of input	Allocation of influence to		
	Farmer	*Spouse*	*Other family members/ employees*
Tractor (n=125)			
1. information search/evaluation of alternatives	88.1%	4.2%	7.7%
2. final decision	80.2%	11.0%	8.8%
3. execution of the purchase	85.1%	7.4%	7.5%
Fertilizer-spreader (n=95)			
1. information search/evaluation of alternatives	87.0%	3.6%	9.4%
2. final decision	87.7%	4.1%	8.2%
3. execution of the purchase	90.2%	3.4%	6.4%
Process-automation systems (n=153)			
1. information search/evaluation of alternatives	81.8%	8.8%	9.4%
2. final decision	80.2%	13.6%	6.2%
3. execution of the purchase	81.0%	12.4%	6.6%
Financial loan > Dfl 50,000 (n=202)			
1. information search/evaluation of alternatives	80.2%	17.8%	2.0%
2. final decision	69.7%	28.1%	2.2%
3. execution of the purchase	76.1%	22.3%	1.6%

Table 10.3 *The allocation of influence on farms with two or more farmers (partnerships)*

Types of input	Allocation of influence to		
	Farmers	*Spouses*	*Other family members/ employees*
Tractor (n=49)			
1. information search/evaluation of alternatives	94.6%	2.9%	2.6%
2. final decision	93.3%	4.7%	2.0%
3. execution of the purchase	95.3%	2.9%	1.8%
Fertilizer-spreader (n=38)			
1. information search/evaluation of alternatives	97.4%	1.1%	1.5%
2. final decision	97.1%	0.9%	2.0%
3. execution of the purchase	97.6%	0.9%	1.5%
Process-automation systems (n=61)			
1. information search/evaluation of alternatives	93.3%	3.4%	3.3%
2. final decision	93.6%	3.3%	3.1%
3. execution of the purchase	95.9%	1.3%	2.8%
Financial loan > Dfl 50,000 (n=86)			
1. information search/evaluation of alternatives	91.2%	8.6%	0.2%
2. final decision	88.9%	10.4%	0.7%
3. execution of the purchase	88.4%	10.7%	0.9%

The tables 10.2 and 10.3 show that the farmer(s) is (are) by far the dominant buying center member(s) for buying equipment and contracting a financial loan. On farms with one farmer, i.e. sole proprietorship, the influence of the farmer is about 80% for buying equipment and about 75% for contracting a financial loan. As to the influence of the spouse on these farms, there are some remarkable differences between buying equipment and contracting a financial loan. In the case of buying equipment, the influence of the spouse is generally low. Only when buying process-automation systems, spouses have some influence during the decision stage (about 14%). However, spouses are an important buying center member in the case of contracting a financial loan. Two explanations can be found for the involvement of spouses in relation to buying decisions of a financial loan contract: (1) spouses are often involved in the financial administration of the farm and (2) contracting a financial loan has important consequences for the financial resources of both the household and the farm. Other family members and/or employees are unimportant buying center members on farms with one farmer. Only for buying equipment, other family members and/or employees have some influence on the buying decision. Even, the child who is designated to succeed the farm, is not influential.

On farms with more than one farmer, i.e. in case of partnerships, the influence of the farmers together is 90% or more. Other individuals besides the farmer are even less influential on these farms than on farms with one farmer. In case of partnerships, the spouses only has some influence (about 10%) when contracting a financial loan.

10.3.2 Multiple regression results

Equipment

The results of the multiple regression analysis for the influence of a buying center member in buying equipment are presented in table 10.4.

Table 10.4 shows that the user (*USE*) was the most influential buying center member during all the stages of the buying process of buying equipment. Similar to the influence of a buying center member, the individual amount of product use also ranges from 0% to 100%. The influence of the user is significantly lower in the stages 2 and 3 (+.41 and +.44 respectively) than in stage 1 (+.55). Thus, especially the information search and the evaluation of alternatives are left to the person with the most experience as a user. When buying equipment, the roles of user-gatekeeper are more often combined by the same person than the roles of user-decider and the roles of user-buyer.
The farmer is by far the most influential farm member. Four dummy-variables (*SPOUSE, SUCC, FAMMEM* and *EMP*) were created to compare the influence of a particular individual with that of the farmer. The regression coefficients of all four variables are strongly negative, meaning that the influence of the farmer is much stronger than that of all other individuals. A remarkable result is the difference between the influence of a spouse and a farmer. Although we expect that spouses would have less influence than the farmer, the difference is great (about 25%). The influence of the spouse is equal to the influence of the other family members. An explanation of this result is that the spouse may only be involved in the product decision, i.e. whether or not to buy a particular product, and that she is hardly involved in the actual selection and purchase of an alternative within the product class, viz. the buying decision. Our findings only refer to the latter decision. This effect may be increased for buying technical products, like equipment.

Table 10.4 *Regression results (stepwise, backward elimination) for the influence of a buying center member in buying equipment*

Explanatory variables	stage 1: information search/ evaluation of alternatives			stage 2: final decision			stage 3: execution of the purchase		
	b	*β*	*t-statistic*	*b*	*β*	*t-statistic*	*b*	*β*	*t-statistic*
Product use (*USE*)	.56	.549	30.70**	.42	.434	21.89**	.44	.449	18.40**
Number of hours working in farm (*WORK*)	.08	.030	2.73**	.15	.101	4.89**	.12	.076	3.34**
Influence of an individual compared to a farmer:									
- spouse (*SPOUSE*)	-25.63	-.305	-14.57**	-26.11	-.329	-14.31**	-29.62	-.363	-12.90**
- successor (*SUCC*)	-27.25	-.087	-7.55**	-30.37	-.103	-7.96**	-38.72	-.128	-8.97**
- other family members (*FAMMEM*)	-29.03	-.255	-14.95**	-29.99	-.278	-13.44**	-32.65	-.295	-12.16**
- employees (*EMP*)	-36.86	-.291	-20.54**	-39.53	-.330	-19.90**	-40.81	-.332	-18.63**
Number of farmers (*#FARMER*)	-8.46	-.135	-10.89**	-10.30	-.174	-12.78**	-10.39	-.171	-12.20**
Age (*AGE*)	n.s.	-----	-----	.14	.054	3.57**	.14	.053	3.49**
	R^2 = .797 $F_{7,1583}$ = 889.02** n = 1591			R^2 = .760 $F_{8,1582}$ = 625.93** n = 1591			R^2 = .787 $F_{8,1582}$ = 731.42** n = 1591		

The *t*-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
b = regression coefficient
β = standardized regression coefficient
** significant at $p < .01$ (one-tailed)
* significant at $p < .05$ (one-tailed)
n.s. = not statistically significant

Furthermore, the influence of the successor is not significantly different from that of other family members. Apparently, the status of a child being a successor does not mean more influence on buying decisions. Since an employee has hardly a basis of power, his influence was the lowest.
In addition, as proposed in hypothesis H_3, more farmers, as a result of partnerships (*#FARMER*), decrease the influence of a buying center member. In case of partnerships, the farmers decide together and there is less need for assistance from other farm members. The father gives up part of his influence to his successor, when the successor becomes a partner in a father-son partnership. Moreover, in agreement with hypothesis ($H_{3.1}$), the number of hours of work leads to more influence on buying equipment. This effect is significantly more important in stage 2 (final decision) than in stage 1 (information search/evaluation of alternatives). Finally, the positive effect of age on the influence of a buying center member in the stages 2 and 3 indicates that maturity of the individual is relevant for the final decision and the execution of the purchase

Financial loan

The regression results for the influence of a buying center member in contracting a financial loan > Dfl 50,000 are presented in table 10.5.
This table shows that the degree of involvement in the financial administration of the farm (*USE*) is an important determinant of the influence of a buying center member during all stages of the buying process when contracting a financial loan. Contrary to the results with respect to buying equipment, the influence of the 'users' of the financial loan did not differ significantly during the various stages of the buying process.
As with buying equipment, the farmer is by far the most influential farm member, since the regression coefficients of all four variables (*SPOUSE, SUCC, FAMMEM* and *EMP*) are strongly negative. Although the difference is smaller compared with buying equipment, the spouse is less influential than the farmer. That goes for successors too. The successor has, in the decision stage, significantly more influence than the children of farmers who are not successors. When contracting a financial loan, the spouse and the successor are most influential during the final decision stage (stage 2). The other farm members and the employees do not have much influence when contracting a financial loan.

Table 10.5 *Regression results (stepwise, backward elimination) for the influence of a buying center member in contracting a financial loan > Dfl 50,000*

Explanatory variables	stage 1: information search/ evaluation of alternatives			stage 2: final decision			stage 3: execution of the purchase		
	b	β	*t-statistic*	*b*	β	*t-statistic*	*b*	β	*t-statistic*
Degree of involvement financ. administration (*USE*)	.43	.408	16.28**	.38	.420	16.64**	.39	.390	14.94**
Number of hours working in farm (*WORK*)	.19	.122	4.32**	.14	.103	3.64**	.16	.104	3.54**
Influence of an individual compared to a farmer:									
- spouse (*SPOUSE*)	-28.88	-.362	-12.08**	-18.23	-.263	-8.71**	-24.94	-.329	-10.53**
- successor (*SUCC*)	-22.47	-.061	-3.23**	-15.17	-.047	-2.49**	-29.04	-.083	-4.16**
- other family members (*FAMMEM*)	-33.45	-.305	-10.68**	-31.23	-.328	-11.38**	-31.65	-.304	-9.50**
- employees (*EMP*)	-36.05	-.324	-13.15**	-34.24	-.354	-14.26**	-35.87	-.339	-12.94**
Number of farmers (*#FARMER*)	-9.73	-.155	-7.83**	-9.82	-.180	-9.03**	-10.42	-.175	-8.48**
Age (*AGE*)	n.s.	——	——	n.s.	——	——	.11	.042	1.91*
	R^2 = .709 $F_{7,891}$ = 310.32** n = 899			R^2 = .705 $F_{7,891}$ = 303.86** n = 899			R^2 = .685 $F_{8,890}$ = 242.21** n = 899		

The *t*-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
b = regression coefficient
β = standardized regression coefficient
** significant at $p < .01$ (one-tailed)
* significant at $p < .05$ (one-tailed)
n.s. = not statistically significant

Furthermore, as proposed in hypothesis H_3, more farmers (*#FARMER*) decrease the influence of a buying center member. Similar to buying equipment, the farmers in partnerships decide together, and they hardly involve other farm members. In a father-son partnership, the successor gets more influence at his father's expense, when he becomes a partner. Moreover, the greater the number of hours of work the more influence on contracting a financial loan, which supports hypothesis $H_{3.1}$. Finally, age hardly affects the influence of a buying center member. Generally, older individuals carry out the buying decision, e.g. stage 3 such as negotiations with bank(s).

10.4 THE INFLUENCE OF A BUYING CENTER MEMBER WITH RESPECT TO BUYING MATERIALS

With respect to materials, we distinguished two stages in the buying process: (1) information search/evaluation of alternatives, and (2) ordering the product. For every stage, the respondents had to allocate 100 points among the buying center members in proportion to their influence. The respondents were interviewed about the influence of buying center members during the choice-making stage, if the current supplier was regularly reconsidered. However, only 25% of the respondents passed this criterion. Although many farmers did not reconsider their current supplier, we expected a higher percentage. The low percentage probably may also be caused by misunderstanding the question.
Since buying centers on farms may include farmers, spouses, other family members, and employees, the total amount of influence was divided to these persons. In section 10.4.1, the allocation of influence to the buying center members in the various buying activities is compared for different types of materials. In section 10.4.2, the multiple regression results for buying materials are presented and discussed.

10.4.1 Comparison of the influence allocation to the buying center members

Since the distinction between sole proprietorship and partnership is important for understanding the influence of a buying center member, we distinguish between the allocation of influence on farms with one farmer (table 10.6) and the allocation of influence on farms with two or more farmers (table 10.7).

Table 10.6 *The allocation of influence on farms with one farmer (sole proprietorship)*

Types of input	Allocation of influence to		
	Farmer	*Spouse*	*Other family members/ employees*
Compound feed (n=248)			
1. information search/evaluation of alternatives	82.8%	9.4%	7.8%
2. final decision (n=65)	83.5%	11.1%	5.4%
3. ordering the product	84.0%	10.3%	5.7%
Fertilizer (n=119)			
1. information search/evaluation of alternatives	95.0%	0.7%	4.3%
2. final decision (n=34)	92.4%	0.9%	6.8%
3. ordering the product	95.8%	1.3%	2.9%
Crop protection products (n=205)			
1. information search/evaluation of alternatives	94.5%	1.0%	4.5%
2. final decision (n=36)	89.7%	4.7%	5.5%
3. ordering the product	94.2%	1.5%	4.3%

Table 10.7 *The allocation of influence on farms with two or more farmers (partnerships)*

Types of input	Allocation of influence to		
	Farmer	*Spouse*	*Other family members/ employees*
Compound feed (n=103)			
1. information search/evaluation of alternatives	97.1%	2.1%	0.8%
2. final decision (n=29)	97.9%	2.1%	0.0%
3. ordering the product	98.3%	1.3%	0.4%
Fertilizer (n=36)			
1. information search/evaluation of alternatives	95.1%	0.3%	4.6%
2. final decision (n=13)	95.1%	0.0%	4.9%
3. ordering the product	98.4%	0.0%	1.6%
Crop protection products (n=96)			
1. information search/evaluation of alternatives	96.6%	0.1%	3.2%
2. final decision (n=24)	99.6%	0.4%	0.0%
3. ordering the product	96.4%	1.5%	2.1%

The tables 10.6 and 10.7 show that the farmer(s) is (are) by far the dominant buying center member(s) for buying materials. On farms with one farmer, the influence of farmers for buying compound feed is lower (about 80%) than when buying fertilizer or crop protection products (about 95%). Only the spouse on these farms has some influence when buying compound feed (about 10%). An explanation for this

influence probably is that on dairy and pig farms, the spouse often works in the farm and assists the farmer in feeding the animals.
On farms with more than one farmer (partnerships), the influence of the farmers together is about 95% for all materials. Other individuals besides the farmer are unimportant buying center members on these farms.

10.4.2 Multiple regression results

The results of the multiple regression analysis for the influence of a buying center member in buying materials are presented in table 10.8.

Table 10.8 shows that the user (*USE*) was the most influential buying center member in all activities related to buying materials. Similar to the influence of a buying center member, the amount of product use also ranges from 0% to 100%. In buying materials compared with buying equipment or contracting a financial loan, the user seems a more dominant buying center member, since the coefficients are higher. In order to be involved in buying materials on farm, the buying center members should be (one of) the user(s) of the product. In other words, the buying decisions of materials on farms are determined by users. The influence of the user is significantly lower in the stages 2 (+.65) than in the stages 1 and 3 (+.77 and +.79 respectively). Thus, when buying materials on farms, the role of user-gatekeeper and the role of user-buyer are more often combined in one person than the role of user-decider.
Consistent with findings regarding equipment and financial loans, the farmer is by far the most influential farm member, since the regression coefficients of all four variables (*SPOUSE, SUCC, FAMMEM* and *EMP*) are strongly negative. However, the differences between the influence of the farmer and other buying center members are generally smaller than for buying equipment and contracting a financial loan. Especially, the involvement of the other buying center members in ordering materials is higher than in other buying situations. The spouse and the successor have about 17%, the other family members (successor excluded) about 19%, and employees about 23% less influence than the farmer.

Table 10.8 *Regression results (stepwise, backward elimination) for the influence of a buying center member in buying materials*

Explanatory variables	stage 1: information search/ evaluation of alternatives			stage 2: final decision			stage 3: ordering the product		
	b	*β*	*t-statistic*	*b*	*β*	*t-statistic*	*b*	*β*	*t-statistic*
Product use (*USE*)	.78	.730	42.85**	.64	.624	23.19**	.78	.688	40.78**
Number of hours working in farm (*WORK*)	n.s.	-----	-----	.11	.067	2.82**	.08	.044	2.92**
Influence of an individual compared to a farmer:									
- spouse (*SPOUSE*)	-18.01	-.206	-12.28**	-20.29	-.243	-9.18**	-14.86	-.160	-9.20**
- successor (*SUCC*)	-15.57	-.044	-4.41**	-18.13	-.056	-3.76**	-21.02	-.056	-3.17**
- other family members (*FAMMEM*)	-20.69	-.173	-12.87**	-24.33	-.203	-9.49**	-17.73	-.140	-8.86**
- employees (*EMP*)	-22.91	-.180	-13.79**	-28.02	-.250	-12.21**	-21.03	-.156	-11.94**
Number of farmers (*#FARMER*)	-4.80	-.073	-7.92**	-6.89	-.113	-6.79**	-4.87	-.070	-6.79**
Age (*AGE*)	n.s.	-----	-----	n.s.	-----	-----	.10	.034	3.17**
	R^2 = .876 $F_{6,2466}$ = 2913.39** n = 2473			R^2 = .869 $F_{7,619}$ = 590.02** n = 628			R^2 = .799 $F_{8,2464}$ = 1222.52** n = 2473		

The *t*-statistics are based on heteroskedasticity-consistent estimated standard errors (see White 1980).
b = regression coefficient
β = standardized regression coefficient
** significant at $p < .01$ (one-tailed)
* significant at $p < .05$ (one-tailed)
n.s. = not statistically significant

In addition, as proposed in hypothesis H_3, a high number of farmers at one farm (*#FARMER*) decrease the influence of a buying center member, although the effect is lower for buying materials than for buying equipment and for contracting a financial loan. In case of partnerships, the farmers decide together and there is less need for assistance of other farm members. The father gives up part of his influence to his successor, when the successor becomes a partner in a father-son partnership. Moreover, the number of hours of work leads to more influence on buying materials. This effect is significantly more important in the stages 2 and 3 than in stage 1. Finally, the positive effect of age on the influence of a buying center member in the stages 2 and 3 indicates that older individuals tend to be more influential in deciding about vendor-choice and ordering the product.

10.5 MAJOR FINDINGS AND CONCLUSIONS

Table 10.9 presents a summary of the findings of the effect of explanatory variables on the influence of a buying center member.

Table 10.9 *Summary of the findings of the effect of explanatory variables on the influence of a buying center member at the farm*

	Influence of a buying center member
The share of participation in the farm enterprise	
contribution of product use	++
contribution of working in the farm enterprise	+
The position of an individual in the farm enterprise	
the influence of an individual compared to a farmer:	
- spouse	−−
- successor	−−
- other family members	−−
- employees	−−
Number of farmers	−
Age	+/n.s.[1])

++ = strong positive influence, + = positive influence, n.s. = not significant, − = negative influence, −− = strong negative influence
[1]) ambiguous results

The user is the most influential buying center member for all buying activities on the farm. This means that in small buying centers consisting of at most three members as occurs on farms, role specialization hardly exists. Most of the buying roles are

combined within one person. In general, the farmer is the user, the gatekeeper, the decider and the buyer. Other family members or employees generally have influence on buying decisions only if they are one of the users or the only user. Otherwise, their influence on buying decisions is minimal.

Furthermore, the position of the individual in the farm is also an important determinant of the influence of a buying center member. As expected, the farmer is the most influential buying center member, since he possesses most bases of power, i.e. reward/coercive, expert and legitimate power. Contrary to our hypotheses, the spouse and the successor (one of the children of the farm family) do not have much influence on buying decisions. Their influence is much less than that of the farmer and only a fraction higher than that of the children of the farmer not being a successor. Finally, due to an absence of power bases, employees do not have influence on buying decisions.

The influence of individual buying center members decreases as a result of more farmers per farm. Other farm members become less influential in case of partnerships and the father gives up part of his influence to his successor when the successor becomes a partner in the partnership. Finally, the effect of age on the influence of a buying center member is ambiguous. Only during the last stages of the buying process, the age of the individual is relevant because of the nature of these stages (final decision and execution of the purchase).

CHAPTER ELEVEN

VENDOR LOYALTY OF FARMERS[1]

11.1 INTRODUCTION

Often, farmers buy a product in succession from the same supplier, and they buy different inputs from one and the same vendor. Farmers tend to exhibit this repeat buying behavior with respect to vendors for at least three reasons: (i) because of the scarce discretionary time which can be spent on purchasing, (ii) in order to utilize the contacts with their vendors as advice and expertise, and/or (iii) because of the comfort of not being forced to make a new choice (convenience). Farmers' high repeat buying behavior may lead to the (erroneous) belief on the seller's side that it is indicative of customer satisfaction and commitment. However, this conclusion might be wrong, since other reasons than commitment, such as habit, a lack of decision making, a perceived absence of choice or lack of time to evaluate other alternatives, might be the reason for repeat buying behavior. Therefore, it is essential to distinguish true from spurious vendor loyalty.

True vendor loyalty only exists when repeat buying behavior is accompanied by commitment to the vendor. Repeat buying behavior without commitment is characterized as *spurious vendor loyalty*. Thus, spurious vendor loyalty is repeat buying behavior which is not based on commitment. Although the resultant behavior appears to be the same regardless of the underlying cause, the distinction between true and spurious vendor loyalty is important from a marketing point of view. Farmer's reactions to marketing efforts of competing vendors differ depending on the factors underlying repeat buying behavior. More specifically, a truly loyal group of farmers are less likely to switch vendors as a result of competitive marketing efforts. On the other hand, farmers who merely exhibit repeat buying behavior without commitment would, over time, be more sensitive to competitive marketing activities. Due to their

[1]The first part of this chapter was published in the European Review of Agricultural Economics (Kool 1994)

lack of commitment to a vendor, these farmers could well change vendors in response to very small differences in, for example, price (Jarvis and Wilcox 1977; Assael 1987; Wernerfeldt 1991).
This chapter deals with the empirical results concerning the vendor loyalty of farmers with respect to equipment and materials. Based on the model of farmers' buying behavior developed in chapter four, a number of hypotheses are proposed in section 11.2 stating the relationships between the type of vendor loyalty and the product characteristics, the farm enterprise characteristics, the individual characteristics and other buying characteristics. The data analysis procedures are also discussed in this section. In the sections 11.3 and 11.4, the results with respect to buying equipment and materials are discussed. Farmers are classified into groups based on the two vendor loyalty dimensions. The proposed hypotheses are tested by means of a discriminant analysis. Finally, the most important conclusions are reported in section 11.5.

11.2 HYPOTHESES AND DATA ANALYSIS PROCEDURES

11.2.1 Hypotheses

Since farmers' buying decisions are influenced by the idiosyncrasies of the buying task and the buyer (see section 4.3), farmers' vendor loyalty may also be associated with these contextual factors. These relationships are useful to predict the type of vendor loyalty which will occur in a particular situation. Our attention is focused on the influence of the following variables on the vendor loyalty of farmers: (1) product-related characteristics, i.e. market penetration, purchase complexity and product importance; (2) farm enterprise characteristics, i.e. farm size and participation of family members and employees in the farm enterprise; (3) individual characteristics, i.e. buying experience, quality-consciousness and age; (4) other buying variables, i.e. extensiveness of the buying process and type of relationship with the vendor. The motivation for a certain type of vendor loyalty from the farmers' point of view serves as a guideline for the discussion of the hypotheses.

Time and/or energy costs

Spurious vendor loyalty is explained in the buying behavior literature by inertia (Jarvis and Wilcox 1977; Asseal 1987). Inertia means that a farmer is selecting the same vendor because it is not worth the time and energy to search for another

vendor. The farmer is not selecting the vendor out of strong preferences. In contrast, true vendor loyalty means that the current vendor is chosen after comparing other competing vendors and because of strong preferences. Favourable experiences with the same vendor lead to a commitment which strengthens the relationship and which can compensate for less positive points of the vendor. This reasoning leads to the following hypotheses:

H_{1a}: *True vendor loyalty is associated with a more extended buying process than spurious vendor loyalty.*

Inertia refers to a situation in which a farmer very routinely selects the current vendor without seeking further information and evaluating other vendors. The resulting repeat buying behavior exists without commitment to the vendor, i.e. spurious vendor loyalty. In contrast, true vendor loyalty means that the farmer makes a conscious choice for the current vendor out of a larger group of competing vendors. This choice-making means at least some information search and evaluation of alternatives.

H_{1b}: *Purchase complexity is positively associated with true vendor loyalty.*

H_{1c}: *Product importance is positively associated with true vendor loyalty.*

Purchase complexity is the buying task uncertainty due to the perceived lack of information relevant to a buying situation. Product importance is the perceived significance of the buying decision in terms of the size of the purchase and/or the potential impact of the purchase on the functioning of the farm. Purchase complexity and product importance determine the risk perception in a particular buying situation. The choice of a well-known supplier is a valuable and efficient strategy for farmers to reduce uncertainty in a high-risk situation. Farmers can spend only a very limited amount of time on purchase activities. Vendors are experts for certain inputs and farmers can utilize this expertise by means of loyal behavior. Thus, perceived risk stimulates true vendor loyalty by making a conscious choice for a particular vendor out of a larger group.

Switching costs

Switching costs are the costs incurred in changing vendors. These costs are caused by specific investments which each party has made in a buyer-seller relationship. Switching costs may result from human as well as physical investments. These costs depend on the degree of product standardization since standard products will normally have lower switching costs than customized products. Moreover, switching

costs may also exist because of a personal relationship between the farmer and his vendor. This reasoning leads to the following hypotheses:

H_{2a}: *The market penetration of the product is negatively associated with true vendor loyalty and positively associated with spurious vendor loyalty.*

The market penetration of the product refers to the percentage of potential users who have bought the product. Vendors possess valuable knowledge about products with a low market penetration which farmers lack. Since only few colleagues use these products, the farmer is more dependent on information from the vendor. Because of this dependency, farmers maintain the relationship with their vendor.

Since products become more standardized as they go through the PLC, switching costs are higher in case of innovative products. As a result of these switching costs, farmers may commit themselves to a trustful vendor, or they may choose a familiar vendor with whom they have much experience concerning other products. In the maturity stage of the PLC, farmers may switch easily from one to another supplier since the products are more standardized.

H_{2b}: *A personal relationship between the farmer and his vendor is positively associated with true vendor loyalty and negatively associated with spurious vendor loyalty.*

An interactive relationship between the farmer and the vendor may range from a formal or business relationship to a close personal relationship. A formal relationship can develop into a personal relationship, when both parties invest into the relationship by means of money and time. These investments are worthless outside the relationship (idiosyncratic) and serve to intensify and personalize the relationship, and to gain trust from the other party. Along with investment and trust, commitment is developed and links the parties together.

Switching risks

Switching risk is the uncertainty that farmers face when they can not foresee the consequences of a vendor change. These risks refer to the *potential* costs incurred in changing vendors which the farmer can not totally assess in advance. The higher the perceived switching risks, the lower the chance of a vendor change. The farmer perceives higher levels of switching risks when he lacks buying experience and when he is quality-conscious.

H_{3a}: *Buying experience of the farmer is negatively associated with true vendor loyalty*

The buying experience of the farmer is the number of times that a farmer has bought a particular product. A farmer with little buying experience knows less about the market and alternative suppliers than a farmer with much buying experience. As a result, the farmer is uncertain about the consequences of switching vendors and therefore avoids a change of vendors. He prefers a vendor with whom he has previous buying experience.

H_{3b}: *The quality-consciousness of the farmer with respect to a particular product is positively associated with true vendor loyalty and negatively associated with spurious vendor loyalty.*

Quality-consciousness of farmers determines the relative weight of perceived quality in vendor-choice behavior. Quality-conscious farmers select a vendor who can deliver a high-quality item. A shift to another vendor exposes a farmer to the risk that the new vendor does not meet his quality requirements. Since more quality-conscious farmers have higher quality requirements, these farmers perceive higher switching risks than farmers who are less quality-conscious.

A summary of the hypothesized associations is presented in table 11.1.

Table 11.1 *Summary of the hypothesized relationships between the different types of vendor loyalty and the explanatory variables*

	Types of vendor loyalty	
	True vendor loyalty	Spurious vendor loyalty
Product-related characteristics		
• market penetration (H_{2a})	−	+
• purchase complexity (H_{1b})	+	
• product importance (H_{1c})	+	
Individual characteristics		
• buying experience (H_{3a})	−	
• quality-consciousness (H_{3b})	+	−
Buying variables		
• extensiveness buying process (H_{1a})	+	−
• type of relationship: personal (H_{2b})	+	−

Segmentation

Farm input markets are frequently segmented by means of variables which are relatively easy to measure and available in agricultural statistics. These variables may refer to farm enterprise characteristics, like size, sole proprietorship/partnership and participation of family members in the farm enterprise, and farmer characteristics, like age. Because of the importance of segmenting the farm input market, it is interesting to evaluate the relationships between these variables and the various types of vendor loyalty. It seems plausible to assume that young farmers pursue new ways of buying products. In general, these farmers have a stronger educational background and they put energy into improving their farm. Furthermore, parent-child partnerships are commonly used to arrange the succession of the farm. It makes much difference when the father is still a partner or when the son has taken over the farm enterprise. In the latter case, the son can change vendor, while this might be more difficult would the father still be a partner. Finally, commitment to one supplier is less risky for large farms than for small farms, because the position of the former farms vis-à-vis suppliers is stronger.

11.2.2 Data analysis procedures

Classification of farmers on the basis of the vendor loyalty dimensions

In order to find homogeneous groups of farmers with different types of vendor loyalty, farmers had to be classified on the basis of the two vendor loyalty dimensions, i.e. repeat buying behavior and commitment. The two-stage clustering procedure of Punj and Steward (1983) was used. First, a *hierarchical method* (Ward's minimum variance method) was used in order to obtain a preliminary solution and to determine a candidate number of clusters. Second, an *iterative partitioning method* (K-means method) was used in order to refine the clusters.
The reliability of the cluster solution was demonstrated by a cross-validation procedure recommended by Punj and Steward (1983) and Aldenderfer and Blashfield (1984). The sample was divided randomly into two non-overlapping subsets and the two-stage clustering procedure was carried out separately on each subsample. After that, the cluster solutions of each subset were applied to assign the cases of the other subset. Finally, for each subset, the degree of agreement was determined between the solution of the subset itself and the assignment based on the solution of the other subset. The coefficient of agreement, kappa κ (Cohen 1960), was used as an

objective measure of stability. The external validity of the cluster solution was demonstrated by relating the clusters to variables other than those used to generate the solution.

Analysis of the relationships between (observed) types of vendor loyalty and contextual variables

After the classification of farmers into groups with different types of vendor loyalty, differences on the contextual variables were analyzed. First, the differences of the means of the contextual variables were analyzed with univariate F-tests (ANOVA). After that, the variables with significant differences between groups of farmers with different types of vendor loyalty were subjected to a *multiple discriminant analysis* (MDA) with the clusters as the dependent subgroups and the other related variables as the predictor variables. The purpose of MDA in this study was to determine which of the contextual variables account most for the differences in the average score profiles of the three clusters.

Validation of the results of the MDA is a very important issue, since the analysis may be capitalizing on relationships that exist as an artefact of the sample. For this reason, a 'jackknife approach' was applied in order to reduce bias in estimating the coefficients. This approach partitioned out the effect of a particular subset of the data on an estimate derived from the total sample[2]. The steps involved in performing a jackknife procedure are as follows:

1. Using the full set of data, calculate the statistics of interest: y_{all} .
2. Divide the total sample in k sets of observations; in this study k=10.
3. Leave out each of the sets in turn and for each reduced new subsample calculate the statistics of interest: y_{-j} , j = 1 to k. These statistics are the result of leaving out the j^{th} subset.
4. Define pseudo-values y^*_j by the formula: $y^*_j = ky_{all} - (k - 1)y_{-j}$.
5. Calculate the mean and standard error of the k pseudo-values using the usual formulas.
6. Assuming the pseudo-values to be independent and t (or normally) distributed, then t-test (or z-test) can be performed on the jackknife estimates.

In order to get an indication of the classification errors, the observations of the hold-out set which were left out to calculate y_{-j} were used to get classification results. This procedure was repeated k times and an estimate of misclassifications (or good

[2] More information about the application of the jackknife method with respect to multiple discriminant analysis can be acquired in the article of Crask and Perreault (1977).

classifications) could be obtained by calculating the mean percentage of misclassifications of the k hold-out subsets (Lachenbruch and Mickey 1968; Crask and Perreault 1977).

11.3 VENDOR LOYALTY REGARDING VENDORS OF EQUIPMENT

11.3.1 Classification of farmers based on the vendor loyalty dimensions

The interviewed farmers were classified on the basis of the two dimensions of vendor loyalty, i.e. repeat buying behavior (*RBB*) and degree of commitment (*COMMIT*). The operationalizations of these variables were discussed in section 5.3.1. Table 11.2 presents the results of the cluster analysis of the two subsets and the results of the cross-validation procedure.

Table 11.2 *Results of the cluster analysis of the two subsets*

Subset 1 (n=251)	**Subset 2 (n=252)**
Number of clusters:	*Number of clusters*:
- Coefficient of the Ward's minimum variance method (first stage): 5 clusters 127.03 4 clusters 161.50 3 clusters 204.54 2 clusters 363.58 1 cluster 540.43	- Coefficient of the Ward's minimum variance method (first stage): 5 clusters 89.53 4 clusters 120.92 3 clusters 167.16 2 clusters 294.29 1 cluster 462.37
- K-means (second stage): Three-cluster solution is stable.	- K-means (second stage): Three-cluster solution is stable.
Cross-validation: Agreement between the replication of group 2 into group 1 and the cluster solution of group 1:	*Cross-validation*: Agreement between the replication of group 1 into group 2 and the cluster solution of group 2:
- assignment of 94% to the same cluster; - kappa coefficient: $\kappa = .91$ - test statistic of the κ coefficient: $Z = 18.42$ $p < .01$	- assignment of 100% to the same cluster; - kappa coefficient: $\kappa = 1.00$ - test statistics of the κ coefficient: $Z = 19.15$ $p < .01$

Based on the clustering results of the two subsets using Ward's minimum variance method, a three-cluster solution is chosen for each subset. Stable cluster solutions are determined after 3-4 iterations using an iterative partitioning method (K-means). The cluster solutions of the two groups are compared with each other. The cluster solutions of both subsets are almost identical, because 94% and 100% of the cases

of a subset are assigned to the same cluster based on the solution of the other subset. The κ coefficients are both statistically significant ($p < .01$). A discriminant analysis of the clusters by the cluster variables, i.e. *RBB* and *COMMIT*, gives a hit ratio (percentage of correctly classified cases) of 98.4% and confirms that the cluster membership is not spurious.

Cluster interpretation

To interpret the clusters, table 11.3 provides the means and the standard deviations of the cluster variables for the whole sample and the different clusters. The assumption is confirmed that farmers tend to exhibit repeat buying behavior. The average duration of the relationship with one vendor is 13.5 years and 77% of the interviewed farmers have bought at least one other product from the same vendor besides the product being the subject of the questionnaire.

Table 11.3 *Means (and standard deviations) for the different cluster variables*

Cluster variables	Cluster 1 (n=268)	Cluster 2 (n=123)	Cluster 3 (n=112)	Total (n=503)
Repeat Buying Behavior (RBB,min.=0, max.=28)	4.63 (3.47)	4.95 (4.04)	18.98 (4.63)	7.90 (7.17)
. Duration of the relationship (years)	9.81 (7.80)	10.94 (8.10)	25.22 (5.44)	13.52 (9.71)
. Number of delivered products	2.34 (1.13)	2.23 (1.07)	3.78 (.48)	2.62 (1.18)
Degree of commitment (min.=1, max.=41)	14.92 (6.39)	38.24 (4.22)	22.46 (11.95)	22.31 (12.20)

Three distinct groups of farmers with different types of vendor loyalty are determined:

* Cluster 1: *Spurious vendor loyalty*
  The relationship of the farmers with their vendor has lasted almost 10 years on average and 69% have bought at least one other product. Despite the repeat buying behavior, their commitment to the vendor is low.
* Cluster 2: *True vendor loyalty*
  In a behavioral sense, these farmers are quite similar to the farmers of group 1: the average duration of the relationship is almost 11 years and 72% have bought at least one other product from the same vendor. However, their commitment to the vendor is very high.

* Cluster 3: *Behavioral vendor loyalty*
  The farmers of this cluster are, in a behavioral sense, extremely loyal to their vendor. The average duration of the relationship with the vendor is more than 25 years and all farmers have bought at least one other product (79% five or more other products). These farmers are less committed than the farmers of cluster two, although this cluster is quite heterogeneous with respect to this aspect (relatively high standard deviation). The farmers of cluster three distinguish themselves from the other clusters exclusively on the basis of their very high repeat buying behavior, although some commitment may have been generated by conditioning during the long relationship with the vendor. The vendor loyalty of these farmers is mainly based on habit.

Validation of the cluster results

With respect to the chosen supplier, the following added variables were measured:
- the intention to buy from the same dealer next time;
- regular versus non-regular dealer.

These added variables are used to validate the cluster solution, since it seems plausible to assume that these variables are related to the different types of vendor loyalty. Table 11.4 reflects the relationship between the two variables and the observed vendor loyalty types. Statistical significance of the hypothesized relationships indicate that the clusters are valid.

Table 11.4 *Validation of the vendor loyalty typology*

	Cluster 1 (n=268)	Cluster 2 (n=123)	Cluster 3 (n=112)	Total (n=503)
Intention to continue the relationship: The chance of buying the same product from the same dealer				
1. very low	4.9%	3.3%	0.0%	3.4%
2. low	13.9%	4.9%	5.4%	9.8%
3. high	54.7%	33.3%	39.3%	46.0%
4. very high	26.6%	58.5%	55.4%	40.8%
$\chi^2(6) = 53.60$ ($p < .01$)				
Regular versus non-regular dealer: Do you see this dealer as a regular supplier for the equipment of your farm?				
1. yes	51.9%	76.4%	68.8%	61.6%
2. no	48.1%	23.6%	31.3%	38.4%
$\chi^2(2) = 24.59$ ($p < .01$)				

11.3.2 Description and analysis of farmers' vendor loyalty

Univariate F-tests (ANOVA)

First, the differences of the means of the contextual variables within the different clusters will be analyzed with univariate F-tests (ANOVA). Table 11.5 presents the means and the univariate F-tests of the contextual variables for both the whole sample and for the separate clusters.
Most of the univariate tests are statistically significant ($p < .05$) with the exception of the financial importance of the product (*IMPOR1*$_{eq}$), farm size (*SIZE*), and the number of other family members working on the farm enterprise (*#FAMMEM*).

Table 11.5 *Means and univariate (ANOVA) F-tests of the explanatory variables for the different clusters*

	Total (n=503)	Clusters: Cluster 1 (n=268)	Cluster 2 (n=123)	Cluster 3 (n=112)	*F-test (df: 2,500)*
Product-related characteristics					
market penetration (*MARKPEN*)	3.90	3.97	3.41	4.27	*F=13.01* **
purchase complexity (*COMP*$_{eq}$)	57.04	56.85	59.58	54.72	*F= 3.13* **
product importance:					
- financial (*IMPOR1*$_{eq}$)	13.08	13.19	13.46	12.42	*F= 1.07*
- end-product (*IMPOR2*$_{eq}$)	18.09	18.18	17.22	18.83	*F= 5.09* **
- prod. process (*IMPOR3*$_{eq}$)	13.97	14.04	15.16	12.52	*F= 4.76* **
Farm enterprise characteristics					
farm size (*SIZE*)	1.73	1.70	1.80	1.71	*F= .66*
participation family members					
- *#FARMER*	1.32	1.28	1.29	1.45	*F= 3.74* **
- *#SPOUSE*	.80	.77	.76	.94	*F= 4.77* **
- *#FAMMEM*	.40	.39	.40	.43	*F= .14*
- *#EMP*	.33	.36	.41	.17	*F= 4.88* **
Individual characteristics					
buying experience (*BUYEXP*)	3.10	3.22	2.48	3.47	*F= 4.36* **
quality-consciousn. (*QUALCON*)	15.06	14.72	15.87	15.00	*F= 8.77* **
age (*AGE*)	43.65	42.99	44.03	47.20	*F=10.52* **
Buying variables					
extensiveness proc. (*PROCESS*$_{eq/n}$)	3.68	3.87	3.75	3.13	*F= 3.98* **
pers. relationship (*RELVEN*)	18.38	17.58	19.13	19.48	*F=24.87* **

** significant at $p < .05$
* significant at $p < .10$

On the basis of the contextual variables, the farmers in the three clusters can be described more specifically. The farmers in cluster 1 are young, and they have a high quality-consciousness, a relatively extended buying process and a less personal relationship with their vendor. The relatively extended buying process is contrary to our expectation in hypothesis H_{1a} based on the buying behavior literature. Apparently, farmers with repeat buying behavior and no commitment, i.e. spurious vendor loyalty, often compare their current vendor with alternatives.
The farmers in cluster 2 have a personal relationship with their vendor. They have purchased products which can be characterized as: low end-product importance, high production process importance, high purchase complexity and low market penetration. Furthermore, these farmers have little buying experience and a high quality-consciousness.
The farmers in cluster 3 have a personal relationship with their supplier. They have purchased products which can be characterized as: high end-product importance, low production process importance, low purchase complexity, and a high market penetration. The farmers in cluster 3 have much buying experience and are relatively old. On their farms, the labour is mainly provided by the farmer and his wife.

Multiple Discriminant Analysis

Multiple Discriminant Analysis (MDA) has been used for clarifying the overall relationship between the clusters and the significant variables (see table 11.5). The jackknife estimators of the MDA for the different clusters are presented in table 11.6.

The results in table 11.6 indicate that there were two significant discriminant functions ($p < .01$). The mean hit ratio (percentage of correctly classified cases) of the ten holdout samples is *56%*. Based on the maximum change criterion (53%) and the proportional change criterion (39%), this finding of the MDA is acceptable (Hair et al. 1987). The nature of the differences among the various types of vendor loyalty is clarified by the evaluation of the discriminant function loadings (i.e. correlations between the predictor variables and the multivariate function) and the centroids (i.e. the mean score on each discriminant function for each cluster).

Table 11.6 *The jackknife estimators of the Multiple Discriminant Analysis for the different clusters*

	Discriminant functions	
	I	II
Canonical relationships (based on the total sample):		
Canonical correlation	.407	.303
Wilks' lambda	.773	.909
Chi-square	126.81	47.11
Degrees of freedom	24	11
Probability	.000	.000
Discriminant loadings:		
personal relationship with vendor (*RELVEN*)	.788 **	-.406
age (*AGE*)	.560 **	-.028
extensiveness buying process ($PROCESS_{eqfn}$)	-.316 **	-.078
number of farmers (*#FARMER*)	.314 **	.195
number of spouses (*#SPOUSE*)	.306 *	.277 *
market penetration (*MARKPEN*)	.148	.790 **
quality-consciousness (*QUALCON*)	.189	-.647 **
end-product importance ($IMPOR2_{eq}$)	.116	.496 **
buying experience (*BUYEXP*)	.031	.467 **
production process importance ($IMPOR3_{eq}$)	-.172	-.384 **
purchase complexity ($COMP_{eq}$)	-.086	-.373 *
number of employees (*#EMP*)	-.280 **	-.330 **
Standardized coefficients:		
personal relationship with vendor (*RELVEN*)	.747 **	-.287
age (*AGE*)	.517 **	-.064
extensiveness buying process ($PROCESS_{eqfn}$)	-.150	.064
number of farmers (*#FARMER*)	.325 **	.153
number of spouses (*#SPOUSE*)	.294 *	.388 **
market penetration (*MARKPEN*)	.048	.528 **
quality-consciousness (*QUALCON*)	.039	-.533 **
end-product importance ($IMPOR2_{eq}$)	.038	.402 **
buying experience (*BUYEXP*)	-.220	.076
production process importance ($IMPOR3_{eq}$)	-.048	-.068
purchase complexity ($COMP_{eq}$)	-.125	-.101
number of employees (*#EMP*)	-.228 *	-.134
Group (cluster) centroids:		
Cluster 1	-.388	.143
Cluster 2	.118	-.551
Cluster 3	.753	.258

** signicant at $p < .05$ (two-tailed)
* significant at $p < .10$ (two-tailed)

The first discriminant function orders the three groups of farmers: farmers with spurious vendor loyalty (cluster 1) score very low, while farmers with behavioral

vendor loyalty (cluster 3) score very high, and farmers with true vendor loyalty (cluster 2) score moderately in this function. This discriminant function is most heavily determined by a personal relationship between the farmer and his supplier (*RELVEN*), and the age of the farmer (*AGE*). This finding confirme hypothesis H_{2b} that the absence of a personal relationship is related to spurious vendor loyalty. Especially, young farmers do not have a personal relationship with their vendor. These farmers, who are spuriously vendor loyal, spend much effort in comparing their current vendor with other vendors, i.e. an extended buying process ($PROCESS_{eq/fl}$). These farmers behave differently as would be expected on the basis of the buying behavior literature. The motivation for their behavior is not inertia, but is an active behavior towards the market. Farmers with spurious vendor loyalty do not want to commit themselves to one vendor and want to have the flexibility to change to a different vendor. Consequently, in spite of the stable relationship, the current vendor continually competes with rival vendors.
Besides, the participation of family members in the farm enterprise also determines the first discriminant function. For behavioral vendor loyalty (cluster 3), a relatively high number of farmers and wives (*#FARMER* and *#SPOUSE* respectively) and fewer employees (*#EMP*) participate in the farm enterprise. There are many partnerships in cluster three, since the number of farmers (and wives) can by definition only be more than one in such a form of business organization. Partnerships are often used to arrange the succession of the farm (father-son partnerships). During this period, the status quo of the business is apparently continued until the father withdraws in favour of his successor. After that, the successor possibly explores the market for new opportunities (see cluster 1).

The second discriminant function discriminates between cluster 2 and the clusters 1 and 3, i.e. between farmers with true vendor loyalty (cluster 2), and farmers with spurious and behavioral vendor loyalty (cluster 1 and 3 respectively). This discriminant function demonstrates that true vendor loyalty is associated with the stage of the PLC (*MARKPEN*). In agreement with hypothesis H_{2b}, the farmers experience switching costs when they buy products with low market penetration. In addition, the lack of purchase experience (*BUYEXP*) when buying these products also increases the uncertainty about the consequences in switching vendors (hypothesis H_{3a}). Furthermore, consistent with hypothesis H_{3b}, farmers who are true vendor loyal are more quality-conscious (*QUALCON*) than other farmers. Contrary to hypothesis H_{1c}, end-product importance ($IMPOR2_{eq}$) is negatively associated with true vendor loyalty. Apparently, a farmer prefers flexibility in vendor selection when

buying products which are highly necessary in relation to the current structure of the enterprise (high end-product importance). In agreement with hypotheses H_{1b} and H_{1c}, production process importance ($IMPOR3_{eq}$) and purchase complexity ($COMP_{eq}$) are positively associated with true vendor loyalty.

11.4 VENDOR LOYALTY REGARDING VENDORS OF MATERIALS

11.4.1 Classification of farmers based on the vendor loyalty dimensions

The results of the classification of the interviewed farmers on the basis of the two dimensions of vendor loyalty, i.e. repeat buying behavior (*RBB*) and degree of commitment (*COMMIT*) are shown in table 11.7. This table presents the results of the cluster analysis of the two subsets and the results of the cross-validation procedure.

Table 11.7 *Results of the cluster analysis of the two subsets*

Subset 1 (n=402)	**Subset 2 (n=403)**
Number of clusters:	*Number of clusters*:
- Coefficient of the Ward's minimum variance method (first stage):	- Coefficient of the Ward's minimum variance method (first stage):
5 clusters 168.06	5 clusters 166.89
4 clusters 226.88	4 clusters 204.37
3 clusters 298.75	3 clusters 289.38
2 clusters 526.71	2 clusters 481.77
1 cluster 821.58	1 cluster 786.06
- K-means (second stage): Three-cluster solution is stable.	- K-means (second stage): Three-cluster solution is stable.
Cross-validation: Agreement between the replication of group 2 into group 1 and the cluster solution of group 1:	*Cross-validation*: Agreement between the replication of group 1 into group 2 and the cluster solution of group 2:
- assignment of 99% to the same cluster;	- assignment of 99% to the same cluster;
- kappa coefficient: $\kappa = .98$	- kappa coefficient: $\kappa = .99$
- test statistic of the κ coefficient: $Z = 24.86$ $p < .001$	- test statistics of the κ coefficient: $Z = 26.46$ $p < .001$

A three-cluster solution is chosen for each subset based on Ward's minimum variance method. Stable cluster solutions are determined after 2-3 iterations using an iterative partitioning method (K-means). The cluster solutions of the two groups are compared with each other. The cluster solutions of both subsets are almost identical.

About 99% of the cases of both subsets are assigned to the same cluster based on the solution of the other subset. The κ coefficients are both statistically significant ($p < .01$). A discriminant analysis of the clusters by the cluster variables, i.e. *RBB* and *COMMIT*, gives a hit ratio (percentage of correctly classified cases) of 98.6% and confirms that the cluster membership is not spurious.

Cluster interpretation

To interpret the clusters, table 11.8 provides the means and the standard deviations of the cluster variables for the whole sample and the different clusters. The assumption is confirmed that farmers tend to exhibit repeat buying behavior. The average duration of the relationship with one vendor is 16 years and 74% of the interviewed farmers have bought at least one other product from the same vendor besides the product being the subject of the questionnaire.

Table 11.8 *Means (and standard deviations) for the different cluster variables*

Cluster variables	Cluster 1 (n=394)	Cluster 2 (n=214)	Cluster 3 (n=197)	Total (n=805)
Repeat Buying Behavior (RBB, min.=0, max.=28)	4.59 (3.45)	4.96 (3.89)	18.12 (4.53)	8.00 (6.94)
. Duration of the relationship (years)	11.17 (8.12)	13.21 (11.01)	28.86 (9.99)	16.04 (11.95)
. Number of delivered products	2.17 (1.02)	1.96 (.99)	3.43 (.71)	2.42 (1.11)
Degree of commitment (min.=1, max.=41)	13.24 (6.58)	37.94 (4.68)	23.55 (10.34)	22.33 (12.60)

Three distinct groups of farmers with different types of vendor loyalty are determined:

* Cluster 1: *Spurious vendor loyalty*
  The farmer-vendor relationship has on average lasted for some 11 years and 69% have bought at least one other product. Despite their repeat buying behavior, vendor-commitment of the farmers is low.
* Cluster 2: *True vendor loyalty*
  In a behavioral sense, these farmers are comparable to the farmers of group 1: the average duration of the relationship is about 13 years and 58% have bought at least one other product from the same vendor. However, their vendor-commitment is very high.

* Cluster 3: *Behavioral vendor loyalty*
  The farmers of this cluster are, in a behavioral sense, extremely loyal to their vendor. The average duration of the relationship with the vendor is almost 29 years and all farmers have bought at least one other product (56% five or more other products). These farmers are less committed than the farmers of cluster two, although this cluster is quite heterogeneous with respect to this aspect (relatively high standard deviation). The farmers of cluster three distinguish themselves from the other clusters primarily on the basis of their very high repeat buying behavior, although some commitment may have been generated by conditioning during the long relationship with the vendor. The vendor loyalty of these farmers is mainly based on habit.

Validation of the cluster results

With respect to the chosen supplier, we also measured whether or not the vendor was regular. The problem with this variable is that almost all farmers see their current supplier of materials as the regular supplier. For this reason, the differences between the various clusters are small, but statistically significant at $\alpha = .10$. These finding are an indication for the external validity of the clusters.

Table 11.9 *Validation of the vendor loyalty typology*

	Cluster 1 (n=394)	Cluster 2 (n=214)	Cluster 3 (n=197)	Total (n=805)
Regular versus non-regular dealer: Do you see this dealer as a regular supplier for the equipment of your farm?				
1. yes	89.3%	93.9%	93.9%	91.7%
2. no	10.7%	6.1%	6.1%	8.3%
$\chi^2(2) = 5.57$ ($p = .062$)				

11.4.2 Description and analysis of farmers' vendor loyalty

Univariate F-tests (ANOVA)

First, the differences of the means of the contextual variables with respect to the different clusters will be analyzed with univariate F-tests (ANOVA). Table 11.10 presents the means and the univariate F-tests of the buying variables for both the whole sample and for the separate clusters. Due to the specific characteristics of

materials, some modifications were made regarding the explanatory variables which were used to explain the vendor loyalty of farmers. First, market penetration (*MARKPEN*) is not a relevant product-related characteristic for the materials used in this study. Second, age is used as an indicator for buying experience (*BUYEXP*) regarding materials. Finally, farmers buying from farm purchasing cooperatives may buy their materials differently from other farmers. Whether or not buying from a farm purchasing cooperative is indicated by the type of farm input supplier (*COOP*).

Most of the univariate tests were statistically significant ($p < .05$) with the exception of farm size (*SIZE*), quality-consciousness (*QUALCON*), and three variables related to the participation of family members in the farm enterprise (i.e. *#SPOUSE*, *#FAMMEM*, *#EMP*).

Table 11.10 *Means and univariate (ANOVA) F-tests of the explanatory variables for the different clusters*

		Clusters			
	Total (n=805)	Cluster 1 (n=394)	Cluster 2 (n=214)	Cluster 3 (n=197)	*F-test (df: 2,802)*
Product-related characteristics					
purchase complexity ($COMP_{mat}$)	42.34	41.26	44.45	42.20	*F= 3.53* **
product importance:					
- financial ($IMPOR1_{mat}$)	26.40	26.16	28.91	24.14	*F= 9.30* **
- end-product ($IMPOR2_{mat}$)	16.50	16.79	16.82	15.59	*F= 3.45* **
Farm enterprise characteristics					
farm size (*SIZE*)	1.73	1.76	1.67	1.72	*F= 1.06*
participation family members					
- *#FARMER*	1.32	1.31	1.26	1.41	*F= 4.24* **
- *#SPOUSE*	.77	.76	.73	.83	*F= 2.00*
- *#FAMMEM*	.34	.35	.26	.39	*F= 2.24*
- *#EMP*	.35	.39	.31	.31	*F= 1.48*
Individual characteristics					
quality-consciousn. (*QUALCON*)	15.09	15.01	15.17	15.14	*F= .69*
age (*AGE*)	42.77	41.56	42.36	45.62	*F=10.34* **
Buying variables					
extensiveness proc. ($PROCESS_{mat}$)	1.00	1.21	.86	.75	*F=11.44* **
pers. relationship (*RELVEN*)	19.01	18.38	19.86	19.35	*F=23.87* **
type of farm input supplier:					
cooperative (*COOP*)	.53	.45	.44	.77	*F=32.98* **

** significant at $p < .05$
* significant at $p < .10$

The farmers in cluster 1 are young and have a relatively extended buying process and a less personal relationship with their vendor. Moreover, these farmers have bought products with low purchase complexity. The relatively extended buying process is contrary to the expectation in hypothesis H_{1a}. As for buying equipment, farmers with repeat buying behavior and no commitment (i.e. spurious vendor loyalty) often compare their current vendor with alternatives.
The farmers in cluster 2 have a personal relationship with their vendor. They have purchased products which can be characterized as: high purchase complexity, high financial importance, and high end-product importance. Furthermore, these farmers are quite young and, contrary to the expectation in hypothesis H_{1a}, they do not evaluate other vendors frequently.
The farmers in cluster 3 also have a personal relationship with their supplier. They have purchased products which can be characterized as: low financial importance and low end-product importance. The farms in cluster three have the highest number of farmers per farm indicating a relative high number of partnerships. The farmers in cluster 3 are relatively old and most of them buy from farm cooperatives.

Multiple Discriminant Analysis

Multiple Discriminant Analysis (MDA) was used for clarifying the overall relationships between the clusters and the significant variables (see table 11.10). The jackknife estimators of the MDA for the different clusters are presented in table 11.11.

The results in table 11.11 indicate that there are two significant discriminant functions ($p < .01$). The mean hit ratio (percentage correctly classified cases) of the ten hold-out samples is *53%*. Based on the maximum change criterion (49%) and the proportional change criterion (37%), this finding of the MDA is acceptable (Hair et al. 1987). The nature of the differences among the various types of vendor loyalty is clarified by the evaluation of the discriminant function loadings (i.e. correlations between the predictor variables and the multivariate function) and the centroids (i.e. the mean score on each discriminant function for each cluster).

Table 11.11 *The jackknife estimators of the Multiple Discriminant Analysis for the different clusters*

	Discriminant functions	
	I	II
Canonical relationships (based on the total sample):		
Canonical correlation	.360	.269
Wilks' lambda	.808	1.927
Chi-square	166.45	58.63
Degrees of freedom	16	7
Probability	.000	.000
Discriminant loadings:		
type of farm input supplier: cooperative (*COOP*)	.751 **	-.338
age (*AGE*)	.421 **	-.039
extensiveness buying process ($PROCESS_{mat}$)	-.399 **	-.314 **
number of farmers (*#FARMER*)	.234 **	-.191
end-product importance ($IMPOR2_{mat}$)	-.206 *	.081
personal relationship with vendor (*RELVEN*)	.375	.867 **
financial importance ($IMPOR1_{mat}$)	-.198 *	.466 **
purchase complexity ($COMP_{mat}$)	-.054	.329 **
Standardized coefficients:		
type of farm input supplier: cooperative (*COOP*)	.763 **	-.440
age (*AGE*)	.368 **	-.113
extensiveness buying process ($PROCESS_{mat}$)	-.205 *	-.353 **
number of farmers (*#FARMER*)	.256 **	-.151
end-product importance ($IMPOR2_{mat}$)	.202 *	.066
personal relationship with vendor (*RELVEN*)	.339	.774 **
financial importance ($IMPOR1_{mat}$)	-.240 **	.476 **
purchase complexity ($COMP_{mat}$)	.259 **	-.025
Group (cluster) centroids:		
Cluster 1	-.290	-.193
Cluster 2	-.079	.468
Cluster 3	.647	-.109

** significant at $p < .05$ (two-tailed)
* significant at $p < .10$ (two-tailed)

The first discriminant function discriminates between cluster 3 and the clusters 1 and 2, i.e. between farmers with behavioral vendor loyalty (cluster 3), and farmers with spurious and true vendor loyalty (the clusters 1 and 2 respectively). This discriminant function demonstrates that farmers who buy from farm purchasing cooperatives (*COOP*) are behaviorally vendor loyal (cluster 3). These farmers are relatively old (*AGE*) and they do not evaluate other vendors frequently

(*PROCESS*$_{mat}$). These farmers probably have delegated their purchasing task to the cooperatives and they buy what their farm purchasing cooperative offers. These farmers have a passive type of buying behavior (habit). Moreover, there are many partnerships in cluster three (*#FARMER*), since the number of farmers (and wives) can by definition only be more than one in such a form of business organization. In agreement with the findings regarding buying equipment, when a father-son partnership exists for the succession of the farm, the status quo of the business is apparently continued until the father withdraws in favour of his successor. After that, the successor possibly searches the market for new opportunities (see cluster 1).

The second discriminant function discriminates between cluster 2 and the clusters 1 and 3, i.e. between farmers with true vendor loyalty (cluster 2), and farmers with spurious and behavioral vendor loyalty (the clusters 1 and 3 respectively). This discriminant function demonstrates that true vendor loyalty is strongly related to a personal relationship with the vendor. This finding confirms hypothesis H_{2a}.
Furthermore, in agreement with hypothesis H_{1b} and H_{1c}, true vendor loyalty is positively related to financial importance (*IMPOR1*$_{mat}$) and purchase complexity (*COMP*$_{mat}$). Apparently, farmers tend to buy from a well-known vendor in high-risk situations when they buy materials. Finally, contrary to hypothesis H_{1a} but in agreement with the findings of equipment, farmers with spurious vendor loyalty evaluate other vendors more frequently than other farmers. Apparently, the farmers of cluster one prefer to have the flexibility to change vendors if another vendor has a better offer. In fact, they are regularly looking for better opportunities, i.e. a competitive purchasing strategy. Farmers who are spurious vendor loyal behave differently as would be expected on the basis of the buying behavior literature. The motivation for their behavior is not inertia, but in contrast is an active behavior towards the market. Consequently, in spite of the stable relationship, the current vendor continually competes with rival vendors. The farmer with true vendor loyalty (cluster 2) is apparently satisfied and does not have the intention to switch to a different vendor.

11.5 MAJOR FINDINGS AND CONCLUSIONS

Repeat buying behavior

In general terms, farmers buy a product in succession from the same supplier, and they buy different inputs from one and the same vendor (high repeat buying

behavior). With respect to suppliers of equipment, the average duration of the relationship with one vendor is 13.5 years and 77% of the interviewed farmers have bought at least one other product from the same vendor besides the product being the subject of the questionnaire. With respect to suppliers of materials, the average duration of the relationship with one vendor is 16 years and 74% of the interviewed farmers have bought at least one other product from the same vendor besides the product being the subject of the questionnaire. Although all farmers exhibit repeat buying behavior, there are very different types of vendor loyalty.

Types of vendor loyalty

Based on the two vendor loyalty dimensions, i.e. repeat buying behavior and degree of commitment, three types of vendor loyalty are observed regarding suppliers of both equipment and materials. One group of farmers is characterized as *spuriously vendor loyal*, because commitment to the vendor is absent. Another group consists of farmers with *true vendor loyalty*, because their commitment to the vendor is very high. Finally, the third group of farmers have an extremely high repeat buying behavior. Therefore, these farmers are typified as *behaviorally vendor loyal*. Their behavior is primarily based on habit. The similarities between the classifications regarding farmers' vendor loyalty for buying equipment and materials are remarkable.

Analysis of farmers' vendor loyalty

The findings of the analysis of farmers' vendor loyalty are summarized in table 11.12. The major findings and conclusions are discussed per type of vendor loyalty.

True vendor loyalty

Switching cost is an important determinant of true vendor loyalty. If farmers buy unstandardized products with a low market penetration and/or if they have a personal relationship with the vendor, they are truly loyal towards their vendor. For this reason, deliberate relationship management is important with a view to the marketing of innovative products. In addition, investing into a personal relationship with the farmer is a suitable strategy for a supplier of farm inputs to make the farmer less sensitive for competitors' marketing activities.

Switching risk is also a motivation for farmers to become true vendor loyal. If farmers have less buying experience, they are more uncertain about the conse-

quences of switching suppliers and consequently are more committed to a vendor. Apart from this, quality-conscious farmers are more critical in their selection of the vendor and consequently they have more stable relationships with their vendors than farmers who are less quality-conscious.
Finally, time and/or energy costs hardly influence true vendor loyalty of farmers. The results regarding equipment and materials are ambiguous.

Table 11.12 *Summary of the findings of the influence of the explanatory variables on the different types of vendor loyalty*

	Types of vendor loyalty		
	True vendor loyalty	*Spurious vendor loyalty*	*Behavioral vendor loyalty*
Product-related characteristics			
market penetration[1])	−−	+	++
purchase complexity	+	−	−
product importance:			
- financial importance	n.s./+[3])	n.s.	−
- end-product importance	−/+[3])	+	+/−[3])
- production process importance[1])	+	n.s.	−
Farm enterprise characteristics			
farm size	n.s.	n.s.	n.s.
number of farmers/partnerships	n.s.	n.s.	+
Individual characteristics			
age	−	−−	++
buying experience[1])	−−	+	+
quality-consciousness	++/n.s.[3])	−/n.s.[3])	−/n.s.[3])
Buying variables			
extensiveness buying process	+/−[3])	+	−−
personal relationship vendor	++	−−	++
buying from cooperative[2])	−	−	++

++ = strong positive influence, + = positive influence, n.s. = not significant, − = negative influence, −− = strong negative influence
[1]) Only equipment
[2]) Only materials
[3]) Different findings: equipment = before /; materials = after /.

Spurious vendor loyalty

In contrast with the common view in the buying behavior literature, spurious vendor loyalty of farmers is not associated with lack of information seeking and evaluation of alternatives. On the contrary, farmers with repeat buying behavior and no commitment toward the vendor, i.e. spurious vendor loyalty, spend much effort in

comparing their current vendor with rival vendors. Thus, their vendor loyalty is not based on inertia, but is an active behavior towards the market. Farmers with spurious vendor loyalty avoid high commitment to one vendor and want to have the flexibility to change to a different vendor. These farmers are relatively young.
Moreover, the empirical findings suggest that, in case of a father-son partnership, the current situation regarding the vendor is continued until the father withdraws in favour of his successor. After the withdrawal of the father, the successor searches the market for new opportunities.

Behavioral vendor loyalty
Farmers with behavioral vendor loyalty are relatively old and they put little effort in buying inputs. The buying behavior of these farmers is characterized by habit: the farmer routinely selects the same vendor without evaluating alternatives. An explanation for this behavior may be that these farmers prefer the comfort of not being forced to make a new choice (convenience). Furthermore, farmers with behavioral vendor loyalty mainly buy their materials from farm purchasing cooperatives. These farmers probably have delegated their purchasing task to the cooperatives and they buy what their farm purchasing cooperative offers.

A final remark
Although the choice of a well known supplier is described in the buying behavior literature as a valuable strategy to reduce uncertainty in high-risk situations, this strategy is hardly used by farmers. We have only found a weak relationship between perceived-risk variables, i.e. purchase complexity and product importance, and the type of vendor loyalty.

PART III

CONCLUSIONS AND IMPLICATIONS

CHAPTER TWELVE

CONCLUSIONS, IMPLICATIONS, AND SUGGESTIONS FOR FUTURE RESEARCH

12.1 INTRODUCTION

The objectives of the present work are (1) the development of a general model of farmers' buying behavior and (2) an empirical testing of a number of hypotheses based on this model. In this chapter, the main conclusions of our study are summarized and are put in a broader perspective. First, in section 12.2, it is evaluated to what extent the proposed hypotheses in our model of farmers' buying behavior are confirmed by the empirical findings in the chapters 7 to 11. In section 12.3, we will infer from our results some managerial implications for the marketing of farm inputs. Finally, some suggestions for future research are made in section 12.4.

12.2 CONCLUSIONS ABOUT THE PROPOSED MODEL OF FARMERS' BUYING BEHAVIOR IN A BROADER PERSPECTIVE

12.2.1 Theoretical framework

Farmers' buying behavior was studied within the framework of our conceptual model proposed in chapter four and reprinted in figure 12.1. This farmers' buying behavior model focuses on the buying decision, i.e. the selection of an alternative from a product class. It is assumed that the farmer is convinced already that he has to purchase a certain input, and that he can choose between a number of alternatives. This buying problem is solved by the selection of a supplier, a brand and/or a product type and the materialization of the choice.

We assume that farmers intend to behave rationally, but are subjected to limitations (bounded rationality). In order to understand farmers' buying behavior, we distinguish three dimensions: (1) buying process, (2) buying structure, and (3) relationship with suppliers and (brand/vendor) loyalty. The *buying process* refers to the activities a buying unit exhibits in the selection and purchase of an alternative from the product class. The *buying structure* refers to the decision making unit, i.e. the

individuals or members of (in)formal groups involved in the decision making process. The third dimension, *relationship with supplier and (brand/vendor)loyalty* refers to the long-term aspects of buying decisions, i.e. the historical context of a buying decision. The three boxes in the center of figure 12.1 portray these three dimensions.

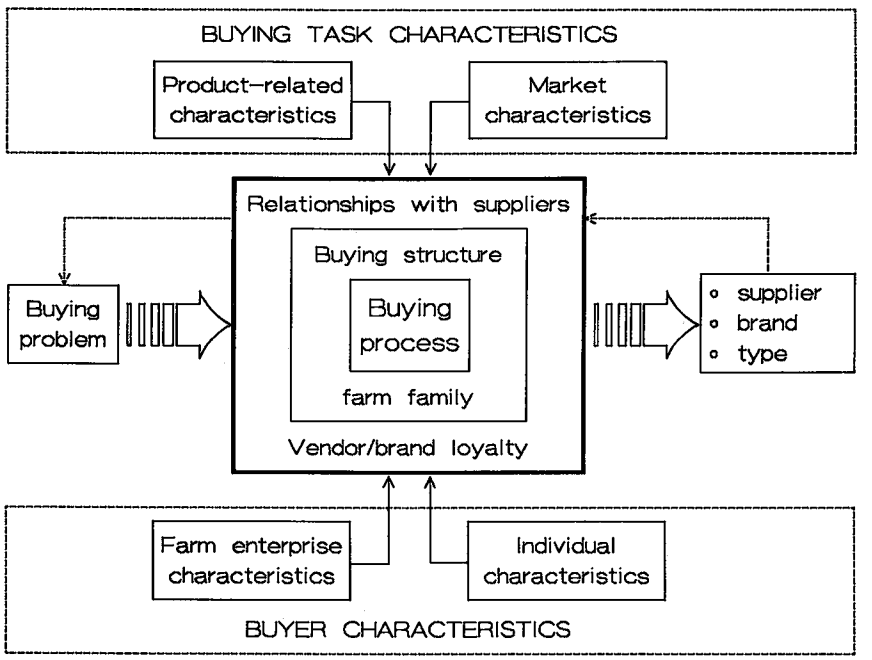

Figure 12.1 *Model of farmers' buying behavior*

In our model, we hypothesize that the performance of the three dimensions of farmers' buying behavior is dependent on four sets of factors: (a) product-related characteristics, (b) market characteristics, (c) farm enterprise characteristics, and (d) individual characteristics. The influence of these sets of factors was discussed in detail in section 4.3. Farmers' buying behavior may also depend on influences of the general environment (see section 4.4). Since these influences are subtle, ubiquitous and difficult to identify, we only devoted our attention to the influence of the buying task characteristics, i.e. product-related and market characteristics, and buyer characteristics, i.e. farm enterprise and individual characteristics, on the three dimensions of farmers' buying behavior.

Our model is based on theories of both industrial and consumer buying behavior. All three dimensions of buying behavior are integrated into one comprehensive framework. This integration is a unique aspect of the model. Furthermore, due to its generality, our model can also be used as a general frame of reference to understand the buying behavior of other small-scale family businesses.

12.2.2 Synthesis of the empirical findings

Although our model identifies many key variables which should be considered in the analysis of farmers' buying behavior, only a limited number of key variables were selected for empirical testing. These variables are presented in table 12.1.

Table 12.1 *Overview of the variables operationalized in the empirical study*

Dimensions of farmers' buying behavior	Explanatory variables
Buying process • extensiveness of the buying process • width and direction of information search *Buying structure* • autonomous versus joint decision making • buying center size • influence of individual buying center members *Relationships with vendors* • vendor loyalty	*Product-related characteristics* • market penetration[1]) • purchase complexity • product importance • type of product: tangible goods versus services *Farm enterprise characteristics* • farm size and type of farming • participation of farm members in the farm enterprise *Individual characteristics* • personal characteristics: age and number of hours working in the farm enterprise • buying experience • product involvement • quality-consciousness • market orientation *Other variables* • personal relationship with vendor • type of supplier: cooperative[2])

[1]) Only equipment
[2]) Only materials

First, we discuss the most important conclusions evolving from our research with respect to each dimension. This section comes to a close with a discussion on a general characterization of farmers' buying behavior.

Buying process

A comparison between the hypothesized importance and the established importance of the buying task characteristics and buyer characteristics in the farmers' buying process is presented in table 12.2.

Table 12.2 *A comparison between the hypothesized importance and the established importance of the buying task characteristics and buyer characteristics in the farmers' buying process*

	Hypothesized	*Empirical result*
Buying task characteristics:		
Product-related characteristics	***	***/**[1])
Market characteristics	*	n.a.
Buyer characteristics:		
Farm enterprise characteristics	*	*
Individual characteristics	***	**
Other variables:		
Relationship with vendor	**	**

* = some influence, ** = important influence, *** = very important influence
n.a. = not analyzed
[1]) Different findings, equipment = before /, materials = after /.

In accordance with our hypotheses, product-related characteristics, individual characteristics and relationship with the vendor have an important influence on the the farmers' buying process. We briefly summarize the most important findings:

Product-related characteristics

- In the case of buying equipment, market penetration is the major variable that affects the extensiveness of the buying process. Farmers simplify their buying process as a product goes through its life cycle.
- Contrary to our expectations based on the buying behavior literature, perceived risk is not an important argument for the variations in the farmers' buying process. The results concerning the perceived-risk variables, i.e. purchase complexity and product importance, are ambiguous. Product importance only affects the extensiveness of the buying process, while purchase complexity has an important influence on the width of information acquisition. Furthermore, when buying equipment, farmers rely on non-commercial information sources in case of a high-risk buying situation.
- In a comparison between contracting a financial loan (service) and buying equipment (tangible goods), we found that fewer prepurchase activities are

exhibited and fewer information sources are consulted for the former product. Furthermore, farmers rely more heavily on personal information sources for contracting a financial loan than for buying equipment.

Individual characteristics

- Farmers with a high level of ongoing search as a result of product involvement put more efforts in their buying activities than other farmers. Apparently, farmers use their product knowledge, obtained by ongoing search activities, to acquire and process more information relevant to the buying problem. This information originates from a greater diversity in both personal and impersonal information sources. These findings support the "enrichment" hypothesis, that existing product knowledge facilitates the learning of new information.
- Buying experience leads to enhanced buying knowledge including where and when to buy a product. Our empirical study supports the hypothesis that farmers tend to simplify their buying process when they have more buying experience.
- No relationship was found between the quality-consciousness of the farmer and the extensiveness of the buying process/width of information search. The high quality level of most farm inputs may be an explanation for this finding.

Relationship with the vendor

- A personal relationship decreases the evaluation of alternatives. Thus, a farm input supplier may bind a farmer by developing a personal relationship. In addition, with respect to buying materials, farmers buying from cooperatives put less effort in their buying activities than other farmers.

Farm enterprise characteristics

- The buying process of arable and dairy farmers is more extended than the buying process of pig farmers and greenhouse market gardeners. The first mentioned farmers probably are willing to spend more effort and time on buying their inputs because they have more discretionary time available to come to their buying decisions during periods of relatively low work loads.
- Greenhouse market gardeners mainly consult personal, non-commercial information sources due to the high concentration of Dutch market gardeners in a small area and consequently are at small distances from colleagues, extension services and research stations.

From our findings, we can conclude that the farmers' efforts to solve the buying problem vary from very extensive to routinized depending on the buying situation. A

very extended buying process occurs when farmers buy innovative products. The farmers are unfamiliar with the product (low market penetration) and the buying situation (little buying experience), nor do they often have personal relationships with the suppliers of these products. Much information is gathered and many alternatives are evaluated before they reach an accurate decision. Conversely, farmers tend to decide very quickly in case of buying familiar products. Especially, when the farmer has much buying experience and/or has a personal relationship with the supplier of the product, the buying process is performed with little effort. The buying process is even more routinized when farmers have a low level of ongoing search as a result of an absence of product involvement.

With respect to farmers' buying behavior, it is important to distinguish product knowledge from buying knowledge. Product knowledge refers to farmers' cognitive representation of information about the product and can be obtained by ongoing search activities. It stimulates the processing of new information during the buying process. On the other hand, buying knowledge is the cognitive representation of how to buy a product based on buying experience. A higher level of buying knowledge leads to a simplification of the buying process and this effect is contrary to the influence of product knowledge.

Buying structure

A comparison between the hypothesized importance and the established importance of the buying task characteristics and buyer characteristics in farm buying structures is presented in table 12.3.

Table 12.3 *A comparison between the hypothesized importance and the established importance of the buying task characteristics and buyer characteristics in buying structures on farms*

	Hypothesized	*Empirical result*
Buying task characteristics:		
Product-related characteristics	**	*
Market characteristics	*	n.a.
Buyer characteristics:		
Farm enterprise characteristics	***	***
Individual characteristics	*	*

* = some influence, ** = important influence, *** = very important influence
n.a. = not analyzed

In general, buying centers on Dutch farms consist of one or two persons. Farm enterprise characteristics are the most important explanatory variable in the farm buying structure. Before drawing conclusions regarding farm buying structures, we briefly summarize the main findings:

Farm enterprise characteristics

- The number of users is an important determinant of joint decision making and buying center size. Participation in farm operations and a degree of responsibility for specific farm operations stimulate participation in the buying process.
- Joint decision making and buying center size depend on the existence of partnerships. Farmers in partnerships decide together, and they hardly involve other farm members.

Product-related and individual characteristics

- The influence of product-related characteristics is less than expected. Only the financial importance of the product has a significant influence on farm buying structures. Joint decision making occurs more often when farmers buy products which are financially important. Buying experience, as an individual characteristic, hardly influences joint decision making and the buying center size.
- The influence of a buying center member is affected by his/her measure of product use, the number of hours working in the farm enterprise, and the individual role in the farm enterprise.

Based on these findings, we can conclude that in particular variables related to the farm enterprise determine farm buying structures. The division of responsibilities and power across the farm members is very important. Buying centers consisting of two or more members often occur in case of partnerships, because then the farm is managed by two (or more) farmers who both work in the farm and use the product. Farm buying structures are rather independent of the buying situation.

Vendor loyalty

Farmers are generally characterized by high repeat buying behavior. They often buy a product in succession from the same supplier, and they often buy different inputs from one vendor. When buying equipment, the average duration of the relationship with one vendor is 13.5 years and 77% of the interviewed farmers have bought at least one other product from the vendor besides the product being the subject of the questionnaire. More loyal behavior occurs when buying materials: the average

duration of the relationship with one vendor is 16 years and 74% of the interviewed farmers have bought at least two products from this vendor.
Given the high repeat buying behavior of farmers, we expected to find two types of vendor loyalty based on the buying behavior literature. In our research, however, we found three different types of vendor loyalty, which are described briefly.

True vendor loyalty
Farmers with true vendor loyalty are very committed towards their vendor because they are confronted with large switching costs and switching risks. Switching costs are the costs incurred from changing vendors and result from physical investments as well as personal investments, like a personal relationship with the vendor. These costs are lower when products go through their life cycle since products are more standardized in the later stages of the PLC. Both a low market penetration and the presence of a personal relationship with the vendor positively influence true vendor loyalty.
True vendor loyalty is also influenced by a lack of buying experience and quality-consciousness of the farmer. These two individual characteristics cause that farmers are uncertain about the consequences of a vendor change (switching risk). Therefore, quality-conscious farmers with little buying experience avoid a vendor change.

Spurious vendor loyalty
Despite the high repeat buying behavior, farmers with spurious vendor loyalty are hardly committed to their vendors. Although inertia is an explanation for spurious vendor loyalty in the buying behavior literature, farmers with spurious vendor loyalty demonstrate an active behavior towards the farm input market. These farmers try to avoid dependence on one vendor and consequently they want to have the flexibility to change to another vendor. These farmers spend much effort on evaluating alternatives and are relatively young. Spurious vendor loyalty is hardly found when the buying risks are perceived as high.

Behavioral vendor loyalty
Behavioral vendor loyalty is distinguished from the other farmers with an extreme high repeat buying behavior. The latter type puts little effort in buying their inputs. The buying behavior of these farmers is characterized by habit. In fact, farmers with behavioral vendor loyalty fit the most passive type of buying behavior. They prefer not to be forced to make a new choice (convenience). Farmers with behavioral vendor loyalty are relatively old and they buy their materials mainly from farm purchasing cooperatives.

Table 12.4 *A comparison between the hypothesized importance and the established importance of the buying task characteristics and buyer characteristics in the three types of farmers' vendor loyalty*

	Hypothesized	*Empirical result*
Buying task characteristics:		
Product-related characteristics	**	**
Market characteristics	***	n.a.
Buyer characteristics:		
Farm enterprise characteristics	*	—
Individual characteristics	*	**
Other variables:		
Relationship with vendor	**	**

— = hardly or no influence, * = some influence, ** = important influence,
*** = very important influence
n.a. = not analyzed

The occurrence of a certain type of vendor loyalty depends on product-related characteristics, individual characteristics, and the type of relationship with vendor (see table 12.4). Much buying risk as a result of little buying experience, high quality-consciousness and/or buying products with low market penetration, combined with a personal relationship with the vendor positively influences true vendor loyalty. Thus, product-related characteristics (market penetration), individual characteristics (buying experience and quality-consciousness) and a personal relationship with vendor are all important explanatory variables of true vendor loyalty. In addition, farmers with spurious vendor loyalty are relatively young. These farmers prefer flexibility vis-à-vis their vendor. Finally, farmers with behavioral vendor loyalty are relatively old. These farmers stick to a specific buying routine, which is difficult to change.

A general characterization of farmers' buying behavior

Farmers' buying behavior is extrinsically motivated. Farmers especially value the consequences of the purchase activity, i.e. the solution of the buying problem. The experiences with the purchase activity and/or with the product for its own sake (intrinsic motivation) are of secondary importance. While examples of intrinsically motivated buying behavior can be found in consumer behavior, this type of buying behavior is unlikely in relation to farmers' buying behavior.

Purchasing is just one of the many management tasks of the farmer. In this respect, the farmer differs from the purchaser of an organization, who is specialized in

purchasing. The farmer perceives time spent on buying decisions at the expense of other management tasks. Often, purchasing is not the first priority of the farmer.

These two aspects of farmers' buying behavior, i.e. extrinsic motivation and purchasing as a partial management task, determine that farmers try to purchase efficiently. Farmers want to achieve a maximum result in a minimum amount of time. Consequently, farmers' buying behavior is generally characterized by the ambition to simplify buying decision-making and to save time. Farmers' buying behavior is generally based on high repeat buying. They often buy the same product in succession from one supplier, and they often buy different inputs from one vendor (vendor loyalty). Farmers tend to simplify their buying problems by a process of learning over time. In case of well-known products and familiar buying situations, farmers decide very quickly, while they decide very carefully when buying innovative products and in unfamiliar buying situations (little buying experience). Also, evaluation of alternatives decreases in case of a personal relationship with the vendor. Finally, farm buying centers mainly consist of one or two individuals.

12.3 INFERENCES FROM RESEARCH RESULTS WITH RESPECT TO FARM INPUT MARKETING

In this section, we formulate a number of inferences based on (a combination of) our empirical findings.

Inference 1: *Farm input marketing has to be adapted to the product life cycle since farmers adapt their buying behavior to the stage of the PLC.*

In the case of innovative products and unfamiliar buying situations, farmers decide very carefully by gathering a great deal of information and by evaluating several alternatives. If products and buying situations are familiar, farmers decide very quickly and they merely examine prices and special bargains without much information search. In the latter situation, price level, distribution and brand policies should have high priority in marketing farm inputs. Presence in the evoked set of farmers is vital for a brand and/or a vendor.

Inference 2: *Investment by suppliers of farm inputs into personal relationships with farmers is an important instrument to achieve competitive advantage.*

Depending on the willingness of farmers, a farm input supplier may try to develop a strong relationship with the farmer by devoting personal resources (investments), like money and time, to the relationship. These investments serve to intensify and personalize the relationship, and to gain trust from the farmer. Together with trust, commitment is developed and links the parties together. The role of a salesman is crucial in developing a personal relationship. Thus personal selling and management of customer relationships are essential in marketing farm inputs.

When a personal relationship exists, farmers spend little effort on buying activities and evaluate few alternatives. Furthermore, these farmers are truly loyal towards their vendors. Thus, investing in personal selling in order to personalize the relationships with farmers is a suitable strategy for farm input suppliers to make their customers less sensitive to the competitors' marketing activities.

Inference 3: *Different types of vendor loyalty require a specific relationship management.*

Although all farmers tend to exhibit a high repeat buying behavior, there are some remarkable differences between the farmers in their vendor loyalty.

Farmers with spurious vendor loyalty avoid commitment towards a vendor and prefer flexibility to change to another vendor. Consequently, a farm input supplier should not invest into a personal relationship with the farmer but has to be competitive, because these farmers often evaluate other suppliers. The farmers with spurious vendor loyalty buy from the same vendor for a certain period, because they are satisfied with the performance of the supplier compared to other suppliers.

Farmers with true vendor loyalty, are committed towards their vendor because of strong preferences. These farmers are willing to invest into a relationship and to develop a personal relationship. Investments into the relationship with the farmer strengthen the relationship.

Both types of farmers should be approached by vendors with a specific relationship management. Farmers with behavioral vendor loyalty do not require specific type of relationship management. These farmers put little effort in buying inputs and they only prefer not to be forced to make a new choice (convenience).

Inference 4: *Increasing farmers' product involvement is an important element in the strategy of a farm input supplier aiming at market share expansion.*

Farmers with relatively high levels of ongoing search as a result of product involvement tend to put more efforts in their buying activities. These farmers also acquire information from more information sources and they can be reached more effectively by impersonal information or mass-media. These farmers are open to consider alternatives.

Product involvement stems from the farmer's perception that the product class meets important values and goals. As discussed in section 4.3.5, these goals can be of (1) utilitarian value (i.e. economic, rational, functional goals), (2) have sign-value (i.e. social, self-concept related, or impression management goals), and/or (3) give sensory pleasure or experiential expectations. Product involvement can be increased by creating problems related to one or more of these goals.

Inference 5: *Market segmentation on the basis of farm enterprise characteristics is a fruitful approach to differentiate between different farm buying structures.*

Identification of farm buying structures is essential in order to realize a 'fine tuning' of marketing strategies. Due to the dominance of farm enterprise characteristics in explaining joint decision making and the number of decision makers involved, i.e. buying center size, these characteristics are pre-eminently suited to segment the market. More specifically, the relevant farm enterprise characteristics, i.e. the number of users, the number of farmers (sole proprietorship versus partnerships), the number of individuals working in the farm enterprise and type of farming, favour important conditions for segmentation variables, i.e. measurability, accessibility and connection to buying behavior (Kotler 1991).

12.4 SUGGESTIONS FOR FUTURE RESEARCH

In the final section of this study, we will make a number of suggestions for future research on farmers' buying behavior.

Farm income allocation process (FIAP)

- As stated in chapter two, the FIAP consists of three decisions, i.e. budget decision, product decision, and buying decision. We have researched the last decision from a behavioral point of view. We have focused our attention on how

farmers make their buying decisions, instead of determining whether or not they have made an optimal choice. The same approach can be used to investigate how farmers make budget and product decisions. In addition to the current knowledge of these decisions based on the economic theory, a behavioral approach to which elements of our model are applied may provide complementary understanding of the FIAP. In this respect, concepts like buying structure, i.e who is involved in the decision-making process, and buying process, i.e. what activities are executed in order to come to a decision, may be useful.

Buying structure

- Joint decision making often occurs in case of partnerships. An important aspect of the joint decision making process is group choice strategy and conflict resolution. Group choice strategy refers to the assessment of a group choice by combining individual preferences. Especially in the case of partnerships, more research is needed to understand how buying decisions are made. Studies by Choffray and Lilien (1980) and Wilson et al. (1991) provide an excellent frame of reference to test hypotheses concerning group choice strategy.

Relationships with suppliers and (vendor/brand) loyalty

- In addition to the two types of vendor loyalty proposed in the buying literature, we have found a third type of vendor loyalty. Also, it appeared that spurious vendor loyalty of farmers could not be explained by inertia, but by an active search of farmers in the farm input market. It might be interesting to test whether the same type of behavior and the same reasons for it can be found in other types of buying behavior.
- Since clear differences exist between the different types of vendor loyalty, it would be interesting to study the motivation for this behavior. Based on a model by Campbell (1985), we proposed in section 4.2.3, that a farmer may exhibit two types of purchasing strategies. A farmer may exhibit a *competitive strategy*, in which he is taking advantage of market forces for every discrete transaction. On the other hand, a farmer may deploy a *cooperative strategy*, in which he is willing to establish a stable long-term relationship with a supplier, to exchange information openly, and to trust each other. Farmers with spurious vendor loyalty are probably exhibiting a competitive strategy, while farmers with true vendor loyalty may deploy a cooperative strategy. Farmers with behavioral vendor loyalty probably do not choose explicitly for a certain strategy. These hypotheses may be interesting for further study.

APPENDIX ONE

COMPARISON BETWEEN RESEARCH POPULATION AND SAMPLES

Table I.1 *Comparison between the research population and the stratified sample based on farm size.*

	Research population		*Stratified sample*		*Kolmogorov-Smirnov test*
	%	cum. %	%	cum. %	deviation (D)
Arable farming	n = 7,009		n = 578		D_{crit} = 5.9%[1])
* 40 - 70 NGE	51.3%	51.3%	51.1%	51.1%	−0.2%
* 70 - 100 NGE	29.3%	80.6%	32.8%	83.9%	+3.3%
* > 100 NGE	19.4%	100.0%	16.1%	100.0%	0%
Dairy farming	n = 21,512		n = 654		D_{crit} = 5.4%[1])
* 40 - 70 NGE	69.2%	69.2%	67.3%	67.3%	−1.9%
* 70 - 100 NGE	22.8%	92.0%	23.3%	90.6%	−1.4%
* > 100 NGE	8.0%	100.0%	9.4%	100.0%	0%
Pig farming	n = 4,312		n = 641		D_{crit} = 5.8%[1])
* 40 - 70 NGE	65.2%	65.2%	61.0%	61.0%	−4.2%
* 70 - 100 NGE	22.2%	87.4%	23.5%	84.5%	−2.9%
* > 100 NGE	12.6%	100.0%	15.6%	100.0%	0%
Greenhouse market gardening	n = 7,261		n = 368		D_{crit} = 7.3%[1])
* 40 - 70 NGE	26.5%	26.5%	15.6%	15.6%	−10.9%
* 70 - 100 NGE	27.6%	54.0%	26.3%	41.9%	−12.1%
* > 100 NGE	46.0%	100.0%	58.1%	100.0%	0%

[1]) The critical value of D is based on α = .05

Table I.2 *Comparison between the stratified sample and the interviewed farmers based on farm size.*

	Stratified sample		*Interviewed farmers*		*Kolmogorov-Smirnov test*
	%	cum. %	%	cum. %	deviation (D)
Arable farming	n = 578		n = 217		D_{crit} = 10.8%[1])
* 40 - 70 NGE	51.1%	51.1%	46.5%	46.5%	−5.4%
* 70 - 100 NGE	32.8%	83.9%	39.2%	85.7%	+1.8%
* > 100 NGE	16.1%	100.0%	14.3%	100.0%	0%
Dairy farming	n = 654		n = 327		D_{crit} = 9.2%[1])
* 40 - 70 NGE	67.3%	67.3%	62.7%	62.7%	−4.6%
* 70 - 100 NGE	23.3%	90.6%	25.4%	88.1%	−2.5%
* > 100 NGE	9.4%	100.0%	11.9%	100.0%	0%
Pig farming	n = 641		n = 187		D_{crit} = 11.3%[1])
* 40 - 70 NGE	61.0%	61.0%	51.6%	51.6%	−9.4%
* 70 - 100 NGE	23.5%	84.5%	33.5%	85.1%	+0.6%
* > 100 NGE	15.6%	100.0%	14.9%	100.0%	0%
Greenhouse market gardening	n = 368		n = 147		D_{crit} = 13.3%[1])
* 40 - 70 NGE	15.6%	15.6%	8.2%	8.2%	−7.4%
* 70 - 100 NGE	26.3%	41.9%	30.6%	38.8%	−3.1%
* > 100 NGE	58.1%	100.0%	61.2%	100.0%	0%

[1]) The critical value of D is based on α = .05

Table I.3 *Comparison between the research population and the interviewed farmers based on the age of the farmer.*

	Stratified sample		*Interviewed farmers*		*Kolmogorov-Smirnov test*
	%	cum. %	%	cum. %	deviation (D)
Arable farming	n = 7,009		n = 217		D_{crit} = 9.4%[1])
* ≤ 30 years	3.1%	3.1%	4.1%	4.1%	+1.0%
* 31 - 40 years	19.7%	22.8%	22.6%	26.7%	+3.9%
* 41 - 50 years	33.0%	55.8%	35.5%	62.2%	+6.4%
* 51 - 60 years	31.3%	87.2%	27.2%	89.4%	+2.2%
* > 60 years	12.8%	100.0%	10.6%	100.0%	0%
Dairy farming	n = 21,512		n = 327		D_{crit} = 7.6%[1])
* ≤ 30 years	2.7%	2.7%	2.8%	2.8%	+0.1%
* 31 - 40 years	18.8%	21.5%	20.5%	23.2%	+1.7%
* 41 - 50 years	31.6%	53.1%	34.6%	57.8%	+4.7%
* 51 - 60 years	34.4%	87.5%	29.7%	87.5%	0%
* > 60 years	12.5%	100.0%	12.5%	100.0%	0%
Pig farming	n = 4,312		n = 188		D_{crit} = 10.1%[1])
* ≤ 30 years	9.5%	9.5%	14.4%	14.4%	+4.9%
* 31 - 40 years	27.6%	37.1%	29.8%	44.1%	+4.0%
* 41 - 50 years	31.0%	68.1%	27.1%	71.3%	+3.2%
* 51 - 60 years	25.7%	93.8%	21.8%	93.1%	−0.7%
* > 60 years	6.2%	100.0%	6.9%	100.0%	0%
Greenhouse market gardening	n = 7,261		n = 147		D_{crit} = 11.3%[1])
* ≤ 30 years	6.5%	6.5%	9.5%	9.5%	+3.0%
* 31 - 40 years	19.7%	26.2%	19.0%	28.6%	+2.4%
* 41 - 50 years	36.3%	62.4%	36.7%	65.3%	+2.9%
* 51 - 60 years	29.8%	92.2%	29.3%	94.6%	+2.4%
* > 60 years	7.8%	100.0%	5.4%	100.0%	0%

[1]) The critical value of D is based on α = .05

APPENDIX TWO

RELIABILITY ANALYSIS AND PRINCIPAL COMPONENT ANALYSIS OF THE MULTI-ITEM MEASURES

Table II.1 *Reliability analysis and principal component of extensiveness of the buying process.*

	Reliability analysis		Principal component analysis	
	Cronbach Alpha	*Item-to-total correlation*	*Eigenvalue first factor*	*Factor loadings*
Extensiveness of the buying process (*PROCESS$_{eqfit}$, n = 809*)	.7973		3.0257 (50.4%)	
a. direct question extensiveness of the buying process		.5747		.7221
b. buying decision time		.3841		.5278
c. number of information sources used		.4687		.6189
d. number of evaluated suppliers		.6902		.8291
e. number of informational conversations with suppliers		.6389		.7852
f. number of suppliers in the evoked set		.5641		.7340

Table II.2 *Reliability analysis and principal component of type of relationship with the vendor.*

	Reliability analysis		Principal component analysis	
	Cronbach Alpha	*Item-to-total correlation*	*Eigenvalue first factor*	*Factor loadings*
Existence of a personal relationship (*RELVEN, n = 1,662*)	.7058		2.3105 (46.2%)	
a. qualification of the relationship (reasonable versus very good)		.3742		.6059
b. importance of the relationship		.4316		.6595
c. vendor's knowledge about the specific farm situation as perceived by the farmer		.5146		.7269
d. attachment to the vendor		.4130		.6292
e. confidence in the vendor		.5490		.7643

Table II.3 *Reliability analysis and principal component of purchase complexity.*

	Reliability analysis		Principal component analysis	
	Cronbach Alpha	*Item-to-total correlation*	*Eigenvalue first factor*	*Factor loadings*
Purchase complexity, equipment ($COMP_{eq}$, $n = 2{,}344$)				
5 items	.7225		2.3926	
a. technical complexity		.4389	(47.9%)	.6441
b. necessity of gathering information prior to purchase		.5838		.7803
c. differences between alternatives		.3507		.5524
d. number of new technical developments		.5377		.7425
e. necessity of supplier support		.5007		.7160
4 items	.7229		2.1900	
a. technical complexity		.4374	(54.7%)	.6663
b. necessity of gathering information prior to purchase		.5653		.7872
d. number of new technical developments		.5085		.7417
e. necessity of supplier support		.5309		.7591
Purchase complexity, materials ($COMP_{mat}$, $n = 1{,}570$)				
4 items	.6450		1.9615	
b. necessity of gathering information prior to purchase		.4679	(49.0%)	.7467
c. differences between alternatives		.2496		.4653
d. number of new technical developments		.4708		.7410
e. necessity of supplier support		.5234		.7990
3 items	.6856			
b. necessity of gathering information prior to purchase		.4868	1.8424 (61.4%)	.7737
d. number of new technical developments		.4582		.7474
e. necessity of supplier support		.5588		.8279

Table II.4 *Reliability analysis and principal component of quality-consciousness.*

	Reliability analysis		Principal component analysis	
	Cronbach Alpha	*Item-to-total correlation*	*Eigenvalue first factor*	*Factor loadings*
Quality-consciousness (*QUALCON, n = 1,686*)	.7586		2.3433 (58.6%)	
a. willingness to pay more for better quality		.4081		.6150
b. intention to work only with high quality specimen		.5356		.7515
c. decisiveness of quality in buying decisions		.6216		.8208
d. endeavour to purchase only the best quality		.6640		.8524

Table II.5 *Reliability analysis and principal component of market orientation.*

	Reliability analysis		Principal component analysis	
	Cronbach Alpha	*Item-to-total correlation*	*Eigenvalue first factor*	*Factor loadings*
Market orientation (*MARKOR, n = 879*), *8 items*	.6412		2.3633 (29.5%)	
a. intention to know exactly the requirements of the consumer		.4067		.6308
b. intention to know the final users of the output		.4404		.6679
c. the agriculture has to produce more environment friendly		.2099		.3368
d. market research concerning new market possibilities is not important (recoded)		.1691		.2814
e. flexibility to the changes in his output markets		.3149		.5251
f. intention to follow the developments of alternative agricultural production		.3060		.4970
g. intention to adapt to the changes in output markets		.4727		.6901
h. discussion of new farm activities with colleagues		.3689		.5726
6 items	.6629		2.2540 (37.6%)	
a. intention to know exactly the requirements of the consumer		.4045		.6301
b. intention to know the final users of the output		.4455		.6750
e. flexibility to the changes in his output markets		.3262		.5420
f. intention to follow the developments of alternative agricultural production		.3156		.5112
g. intention to adapt to the changes in output markets		.4987		.7156
h. discussion of new farm activities with colleagues		.3673		.5781

APPENDIX THREE

THE CONTRIBUTION OF INFORMATION SOURCES

III.1 EQUIPMENT AND FINANCIAL LOAN

Table III.1 *The contribution of information sources with respect to buying a tractor*

Information sources	Arable farmers (n = 76)	Dairy farmers (n = 88)
Personal non-commercial		
* colleagues/friends	12.4%	17.7%
* extension service	2.2%	1.0%
* financial advisors	7.3%	6.9%
* other non-commercial personal sources	1.3%	0.2%
Personal commercial		
* salespersons	22.7%	30.3%
* trade shows	22.1%	22.2%
Impersonal non-commercial		
* articles in farm magazines	13.7%	7.5%
Impersonal commercial		
* advertising	7.6%	3.3%
* sales literature (brochures)	10.7%	10.9%

Table III.2 *The contribution of information sources with respect to buying a fertilizer-spreader*

Information sources	Arable farmers (n = 59)	Dairy farmers (n = 50)
Personal non-commercial		
* colleagues/friends	21.5%	19.3%
* extension service	2.1%	1.8%
* financial advisors	0.2%	1.2%
* other non-commercial personal sources	1.1%	0.8%
Personal commercial		
* salespersons	10.0%	16.3%
* trade shows	28.9%	27.4%
Impersonal non-commercial		
* articles in farm magazines	17.7%	14.2%
Impersonal commercial		
* advertising	5.9%	5.1%
* sales literature (brochures)	12.6%	13.9%

Table III.3 *The contribution of information sources with respect to buying a process-automation systems*

Information sources	Dairy farmers (n = 61)	Pig farmers (n = 80)	Greenhouse market gardeners (n = 69)
Personal non-commercial			
* colleagues/friends	17.7%	14.2%	18.4%
* extension service	8.2%	11.1%	2.6%
* financial advisors	2.4%	1.5%	4.6%
* other non-commercial personal sources	2.1%	10.9%	12.0%
Personal commercial			
* salespersons	20.2%	18.0%	24.3%
* trade shows	17.5%	19.9%	13.5%
Impersonal non-commercial			
* articles in farm magazines	14.8%	10.3%	13.8%
Impersonal commercial			
* advertising	5.3%	3.8%	2.5%
* sales literature (brochures)	11.7%	10.4%	8.3%

Table III.4 *The contribution of information sources with respect to contracting a financial loan > Dfl 50,000*

Information sources	Arable farmers (n = 59)	Dairy farmers (n = 84)	Pig farmers (n = 80)	Greenhouse m. gardeners (n = 54)
Personal non-commercial				
* colleagues/friends	12.5%	14.1%	9.1%	13.8%
* extension service	2.8%	6.8%	8.6%	3.6%
* financial advisors	29.3%	28.8%	29.2%	24.4%
* other non-commercial personal sources	2.5%	0.9%	4.4%	10.2%
Personal commercial				
* salespersons	39.2%	39.8%	39.1%	35.0%
* trade shows	1.4%	1.2%	1.9%	3.7%
Impersonal non-commercial				
* articles in farm magazines	8.4%	5.8%	5.1%	6.9%
Impersonal commercial				
* advertising	1.3%	1.1%	0.4%	0.7%
* sales literature (brochures)	2.7%	1.5%	2.1%	1.8%

III.2 MATERIALS

Table III.5 *The contribution of information sources with respect to buying compound feed*

Information sources	Dairy farmers (n = 162)	Pig farmers (n = 165)
Personal non-commercial		
* colleagues/friends	10.9%	13.0%
* extension service	5.6%	8.3%
* other personal non-commercial sources	0.2%	2.4%
Personal commercial		
* salespersons	41.6%	43.7%
* trade shows	2.7%	6.8%
Impersonal non-commercial		
* articles in farm magazines	18.2%	12.8%
* other impersonal non-commercial sources	0.8%	0.7%
Impersonal commercial		
* advertising	4.4%	2.0%
* sales literature (brochures)	15.8%	10.2%

Table III.6 *The contribution of information sources with respect to buying fertilizer*

Information sources	Arable farmers (n = 75)	Dairy farmers (n = 137)	Greenhouse market gardeners (n = 71)
Personal non-commercial			
* colleagues/friends	9.6%	9.0%	12.5%
* extension service	12.3%	9.1%	7.6%
* other personal non-commercial sources	0.0%	0.0%	30.9%
Personal commercial			
* salespersons	34.5%	36.1%	27.0%
* trade shows	1.0%	2.6%	2.3%
Impersonal non-commercial			
* articles in farm magazines	22.5%	20.0%	12.1%
* other impersonal non-commercial sources	4.2%	3.3%	0.5%
Impersonal commercial			
* advertising	3.2%	4.3%	1.4%
* sales literature (brochures)	12.7%	15.6%	5.8%

Table III.7 *The contribution of information sources with respect to buying crop protection products*

Information sources	Arable farmers (n = 96)	Greenhouse market gardeners (n = 57)
Personal non-commercial		
* colleagues/friends	15.1%	13.8%
* extension service	11.4%	6.9%
* other personal non-commercial sources	3.2%	29.8%
Personal commercial		
* salespersons	29.9%	19.8%
* trade shows	3.8%	3.5%
Impersonal non-commercial		
* articles in farm magazines	17.3%	12.8%
* other impersonal non-commercial sources	0.6%	1.1%
Impersonal commercial		
* advertising	5.9%	3.9%
* sales literature (brochures)	12.9%	8.4%

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SAMENVATTING

Dit onderzoek heeft betrekking op het inkoopgedrag van land- en tuinbouwers. Inkoop is een belangrijke managementtaak op agrarische bedrijven. Nederlandse agrariërs besteden gemiddeld 60% of meer van hun budget aan produkten, die ten behoeve van het bedrijf van derden worden gekocht. Daarnaast wordt de toeleverende industrie aan de agrarische sector geconfronteerd met een toenemende concurrentie als gevolg van stagnerende c.q. krimpende markten, toenemende internationalisatie en kortere produkt-levenscycli. Als gevolg van deze toenemende concurrentie is er een groeiende behoefte aan meer inzicht in het inkoopgedrag van agrariërs.
Het doel van deze studie is tweeledig. Een eerste doel is het ontwikkelen van een algemeen model van het inkoopgedrag van land- en tuinbouwers teneinde de belangrijke variabelen van dit inkoopgedrag te identificeren en een raamwerk te bieden voor hun onderlinge samenhang. Een tweede doel is het empirisch toetsen van een aantal hypothesen inzake het inkoopgedrag van land- en tuinbouwers.

Koopbeslissingen van agrariërs geplaatst in een bredere context

In hoofdstuk 2 wordt het allocatieproces van het agrarisch inkomen (FIAP) besproken. Het FIAP bestaat uit een drietal beslissingsniveaus, te weten budgetbeslissing, produktbeslissing en koopbeslissing. De *budgetbeslissing* heeft betrekking op de allocatie van het beschikbare inkomen over de categorieën bedrijfsbestedingen, huishoudelijke bestedingen en besparingen. Het besluit om een bepaald produkt te kopen is een *produktbeslissing*. De *koopbeslissing* heeft betrekking op de keuze van een alternatief binnen een produktklasse. Het onderzoek richt zich op de koopbeslissing van een agrariër. Aan de hand van het FIAP wordt een beeld verkregen van de condities waarbinnen koopbeslissingen op agrarische bedrijven tot stand komen. In deze benadering namelijk vormen budget- en produktbeslissingen beperkingen voor de keuzevrijheid van een koopbeslissing, aangezien ze aan de laatstgenoemde beslissing voorafgaan.
Ten aanzien van koopbeslissingen worden agrariërs geconfronteerd met complexe keuzesituaties. Het onderzoek richt zich met name op de wijze waarop agrariërs dergelijke complexe keuzesituatie oplossen gegeven de beperkingen ten aanzien van hun cognitieve capaciteiten en de beschikbare tijd.

In de marketingliteratuur wordt uitgebreid aandacht besteed aan koopbeslissingen van consumenten en organisaties. Hiervoor is een groot aantal theorieën en modellen ontwikkeld. Er is echter weinig aandacht besteed aan het koopgedrag van kleine familiebedrijven, zoals agrarische ondernemingen. In hoofdstuk 3 worden enkele algemene karakteristieken van het koopgedrag van agrariërs besproken door dit koopgedrag te positioneren in het brede spectrum van verschillende koopgedragingen. Hiervoor hebben we een klassificatieschema ontwikkeld op basis van de drie dimensies van het koopgedrag. Deze drie dimensies van het koopgedrag zijn: (1) *het koopproces*, de 'wat' van een koopbeslissing of de activiteiten die de koper onderneemt om een alternatief uit een produktklasse te selecteren en te kopen; (2) *de koopstructuur*, de 'wie' van een koopbeslissing of de individuen en/of leden van (in)formele groepen die bij de koopbeslissing betrokken zijn; (3) *relaties met leverancier c.q. loyaliteit naar leveranciers/merken*, de 'historische context' van een koopbeslissing of de lange termijn aspecten van een koopbeslissing.
Vervolgens is het inkoopgedrag van agrariërs in algemene zin gekarakteriseerd op basis van deductie vanuit het ontwikkelde klassificatieschema en op basis van het gegeven dat in Nederland de agrarische produktie in het algemeen in kleine familiebedrijven plaatsvindt. Het koopproces van agrariërs wordt getypeerd als een probleem-oplossend proces, waarin naast functionele tevens emotionele en sociale criteria van belang kunnen zijn. De koopbeslissing wordt in principe om functionele redenen genomen (extrinsieke motivatie). Er bestaan over het algemeen geen vaste procedures om dergelijke beslissingen te nemen, dus de wijze waarop een koopbeslissing tot stand komt, hangt sterk af van de situatie en de persoonlijke inbreng van de beslisser. De koopstructuur van agrarische bedrijven is relatief eenvoudig. Over het algemeen worden koopbeslissingen individueel of in kleine groepen met drie of minder groepsleden genomen. Met betrekking tot relaties met leveranciers c.q. loyaliteit naar leveranciers/merken geldt in het algemeen dat agrariërs trachten de relatie met hun leveranciers zodanig in te richten dat relatief eenvoudig, met weinig kosten, naar een andere leverancier kan worden omgeschakeld. Agrariërs hebben deze flexibiliteit nodig om de relatief zwakke marktpositie ten opzichte van aanbieders van landbouwproduktiemiddelen te compenseren. Desalniettemin hebben agrariërs een hoge mate van leverancierstrouw omdat zij tevreden zijn met hun leveranciers en zij de vaste contacten met leveranciers gebruiken voor advisering en expertise.

Algemeen model van het inkoopgedrag van land- en tuinbouwers

Een algemeen model van het inkoopgedrag van agrariërs komt in hoofdstuk 4 aan de orde. Dit model is ontwikkeld op basis van concepten en theorieën van het industrieel koopgedrag en consumentengedrag. Het model richt zich op de selectie en aanschaf van een alternatief binnen een produktklasse. Het aangrijpingspunt van dit model is het koopprobleem, waarbij de agrariër ervan overtuigd is dat hij een bepaald produkt moet kopen en hij de keuze heeft uit een (groot) aantal alternatieven.
Variaties in het koopgedrag van agrariërs worden bepaald door kooptaak-karakteristieken, koperskarakteristieken en invloeden vanuit de algemene omgeving. De invloeden vanuit de algemene omgeving zijn subtiel, alomtegenwoordig en moeilijk te identificeren. Deze invloeden worden daarom in deze studie niet nader onderzocht. De aard van de kooptaak wordt bepaald door het produkt dat op markten gekenmerkt door bepaalde marktkarakteristieken wordt gekocht. Produkt- en marktkenmerken vormen tezamen de kooptaak-karakteristieken. Koperskarakteristieken kunnen worden onderverdeeld in bedrijfs- en persoonskenmerken. Produkt-, markt-, bedrijfs- en persoonskenmerken zijn vier groepen van variabelen die rechtstreeks de drie dimensies van het koopgedrag van agrariërs (koopproces, koopstructuur en relaties met leverancier c.q. loyaliteit naar leveranciers/merken) beïnvloeden.

Het *koopproces* van agrariërs is getypeerd als een probleemoplossend proces. De agrariër ontwikkelt een aantal activiteiten teneinde het koopprobleem op te lossen. Het koopproces kan variëren van zeer uitgebreid, EPS ("Extended Problem Solving"), tot zeer routinematig, RPS ("Routine Problem Solving"). EPS en RPS verschillen met name van elkaar wat betreft de mate waarin informatie wordt ingewonnen en alternatieven worden geëvalueerd. De koopbeslissing kost de agrariër meer tijd, geld en moeite, naarmate het koopproces uitgebreider is. Deze (psychologische) kosten worden door een agrariër opgebracht indien de voordelen navenant zijn.
De uitgebreidheid van het koopproces hangt ondermeer af van de produktkenmerken, doordat deze kenmerken bepalen in welke mate het waargenomen risico rondom de koopbeslissing kan worden gereduceerd c.q. de beschikbare kennis kan worden vergroot. Meer in het bijzonder wordt naar verwachting het koopproces wat betreft de produktkenmerken beïnvloed door: het produkttype (tastbare goederen versus diensten), de fase van het produkt in de levenscyclus, de complexiteit van de koopsituatie, en het belang van het produkt.

Voorts hebben persoonskenmerken betrekking op de persoonlijke motivatieven (voordelen) om informatie in te winnen en alternatieven tegen elkaar af te wegen. Wij verwachten dat het hierbij met name gaat om koopervaring, betrokkenheid bij het produkt, kwaliteitsbewustzijn en de marktoriëntatie van de agrariër. Tenslotte verwachten wij dat markt- en bedrijfskenmerken in vergelijking tot produkt- en persoonskenmerken weinig invloed hebben op het koopproces van agrariërs.

Koopstructuren op agrarische bedrijven zijn eenvoudig, doordat slechts één of enkele personen (koopcentrumleden) bij de aanschaf van een produkt betrokken zijn. We verwachten dat bedrijfskenmerken in belangrijke mate de omvang van het koopcentrum beïnvloeden. De juridische structuur van het bedrijf, dat wil zeggen eenmansbedrijf of maatschap, bepaalt in sterke mate het aantal koopcentrumleden. Deelname in het koopproces wordt tevens gestimuleerd door participatie in het bedrijf en verantwoordelijkheid voor bepaalde bedrijfstaken. De invloed van een individueel bedrijfslid op de koopbeslissing hangt naar verwachting af van de mate waarin het individu meewerkt op het bedrijf, de positie van het individu in het bedrijf en of er sprake is van een maatschap.
Koopstructuren op agrarische bedrijven worden tevens beïnvloed door produktkenmerken. Naarmate produkten innovatiever, koopsituaties complexer en/of produkten belangrijker zijn, zullen agrariërs waarschijnlijk eerder de hulp van andere bedrijfsleden inroepen om het koopprobleem op te lossen. Tenslotte verwachten we dat markt- en persoonskenmerken in vergelijking tot andere kenmerken weinig invloed hebben op de koopstructuur.

Marktkenmerken zijn vooral belangrijk om *relaties met leverancier c.q. loyaliteit naar leveranciers/merken te verklaren.* In zijn algemeenheid zullen agrariërs vanwege hun zwakke marktpositie ten opzichte van de aanbieders van landbouwproduktiemiddelen trachten de flexibiliteit groot te houden. Agrariërs streven ernaar om met weinig kosten van leverancier te kunnen veranderen. Indien de markt van een landbouwproduktiemiddel wordt gekenmerkt door veel aanbieders, een homogeen produkt en lage toetredingsdrempels, zullen agrariërs naar verwachting eerder verschillende leveranciers tegen elkaar trachten uit te spelen. Vaste relaties met leveranciers en een hoge mate van leverancierstrouw komen dan minder vaak voor. Daarentegen zullen agrariërs trouwer aan hun leverancier zijn indien de markt van een landbouwproduktiemiddel wordt gekenmerkt door weinig aanbieders, een sterk heterogeen produkt en hoge toetredingsdrempels. In de tweede marktsituatie zijn agrariërs afhankelijker van hun toeleveranciers dan in de eerste marktsituatie.

Een belangrijke motivatie voor agrariërs om een goede relatie met hun leverancier te hebben is om de contacten te kunnen gebruiken voor adviezen en specifieke informatie over produkten. Dit is vooral van belang bij innovatieve produkten, complexe koopsituaties en belangrijke produkten. In specifieke situaties kunnen de relaties van agrariërs met hun leveranciers en hun leverancierstrouw worden verklaard uit de koopervaring en het kwaliteitsbewustzijn van agrariërs.

Achtergronden van het veldwerk

In hoofdstuk 5 t/m 11 wordt het empirisch onderzoek beschreven. In hoofdstuk 5 komt de opzet van het onderzoek aan de orde. Het empirisch onderzoek richt zich op de invloed van produkt-, bedrijfs- en persoonskenmerken op het koopproces (uitgebreidheid van het koopproces, gebruik van informatiebronnen), de koopstructuur (type besluitvorming, omvang van het koopcentrum, de invloed van een individueel bedrijfslid op de koopbeslissing) en de leverancierstrouw. Voor het onderzoek zijn *879 agrariërs* geïnterviewd, verdeeld over 4 deelsectoren van de Nederlandse land- en tuinbouw: *akkerbouw, melkveehouderij, varkenshouderij en glastuinbouw*. Deze agrariërs zijn ondervraagd over de wijze waarop zij produkten voor hun bedrijf kopen. De vragen van de enquête hadden betrekking op de aanschaf van *duurzame produktiemiddelen* (trekker, kunstmeststrooier, procescomputer), *grond- en hulpstoffen* (mengvoer, kunstmest, gewasbeschermingsmiddelen) en een *dienst* (afsluiten van een lening > fl 50.000).

In hoofdstuk 6 wordt ingegaan op welke wijze de invloed van een individueel bedrijfslid op de koopbeslissing betrouwbaar kan worden gemeten. Op basis van een klein vooronderzoek is vastgesteld dat slechts één informant per bedrijf nodig is om betrouwbare gegevens over de invloed van alle bedrijfsleden te krijgen. Tevens wordt de wijze waarop die invloed kan veranderen gedurende het koopproces adequaat vastgesteld indien de vragen betrekking hebben op vier fasen van het koopproces: probleemherkenning, informatie inwinnen/evaluatie van alternatieven, beslissing nemen, uitvoering van de koopbeslissing.

Het koopproces van agrariërs

De resultaten met betrekking tot het koopproces komen aan de orde in hoofdstuk 7 en 8. Zoals verwacht wordt het koopproces van agrariërs met name door produkt- en persoonskenmerken en de aanwezigheid van een persoonlijke relatie met de leveran-

cier bepaald. De belangrijkste resultaten met betrekking tot het koopproces kunnen als volgt worden samengevat:

Produktkenmerken

- Marktpenetratie heeft een sterk negatieve invloed op de uitgebreidheid van het koopproces bij de aanschaf van duurzame produktiemiddelen. Deze variabele is de belangrijkste verklarende variabele. Agrariërs vereenvoudigen het koopproces in belangrijke mate gedurende de produkt-levenscyclus.
- In tegenstelling tot onze verwachtingen kunnen de variaties in het koopproces nauwelijks aan de hand van verschillen in het waargenomen risico verklaard worden. De invloed van de variabelen 'complexiteit van de koopsituatie' en 'het belang van een produkt', die tezamen het waargenomen risico van een koopbeslissing representeren, is relatief zwak en niet eenduidig. Het belang van het produkt heeft invloed op de uitgebreidheid van het koopproces, terwijl de complexiteit van de koopsituatie de breedte van de informatie-inwinning beïnvloedt. Daarnaast wordt het belang van niet-commerciële informatiebronnen belangrijker bij koopsituaties met een hoog risico.
- Bij het afsluiten van een lening is het koopproces duidelijk minder uitgebreid dan bij de aanschaf van een duurzaam produktiemiddel. Tevens blijken agrariërs bij het afsluiten van een lening relatief meer informatie van persoonlijke dan onpersoonlijke informatiebronnen te gebruiken.

Persoonskenmerken

- Agrariërs die voortdurend informatie over een produkt bijhouden als gevolg van een grote produktbetrokkenheid, verzamelen meer informatie afkomstig uit een grotere diversiteit aan informatiebronnen dan andere agrariërs.
- De hypothese dat agrariërs hun koopproces vereenvoudigen als ze meer koopervaring hebben, wordt door empirische resultaten bevestigd.
- We hebben geen samenhang vastgesteld tussen het kwaliteitsbewustzijn van een agrariër en zijn koopproces. Het hoge kwaliteitsniveau van de meeste produktiemiddelen kan een mogelijke verklaring zijn voor dit resultaat.

Relatie met de leverancier

- Een agrariër evalueert minder alternatieven en verzamelt minder informatie indien hij een persoonlijke relatie met een leverancier heeft. Een leverancier van landbouwproduktiemiddelen kan een agrariër dus aan zich binden door een persoonlijke relatie met hem op te bouwen. Tevens blijken agrariërs, die bij een coöperatie kopen, duidelijk minder aandacht en tijd aan de inkoop van hun

grond- en hulpstoffen te besteden dan agrariërs die bij andere leveranciers kopen.

Bedrijfskenmerken

- Het koopproces van akkerbouwers en melkveehouders is uitgebreider dan dat van varkenshouders en glastuinders. De eerstgenoemde agrariërs zijn waarschijnlijk in staat meer aandacht en tijd aan de aanschaf van landbouwproduktiemiddelen te besteden gedurende de rustige periode van het jaar.
- Glastuinders gebruiken met name persoonlijke niet-commerciële informatiebronnen, als gevolg van de hoge concentratie glastuinders in een klein deel van Nederland. Hierdoor zijn ondersteunende instanties, onderzoeksstations en voorlichtingsdienst, en collega's gemakkelijk toegankelijk als informatiebron.

Op basis van onze resultaten kunnen we concluderen, dat de mate van inspanning van agrariërs om het koopprobleem op te lossen, varieert van zeer hoog of uitgebreid (EPS) tot zeer laag of routinematig (RPS), afhankelijk van de koopsituatie. Er wordt een uitgebreid koopproces waargenomen indien de agrariër een innovatief produkt koopt. Het produkt (lage marktpenetratie) en de koopsituatie (weinig koopervaring) zijn onbekend voor hem en vaak heeft hij (nog) geen persoonlijke relatie met aanbieders van het produkt. De agrariër wint veel informatie in en weegt vele alternatieven tegen elkaar af alvorens hij de uiteindelijke koopbeslissing neemt. Hier tegenover staat een koopsituatie, waarin een agrariër een produkt met een hoge marktpenetratie koopt dat hij al vaker voor het bedrijf heeft gekocht (veel koopervaring). Vooral als hij een persoonlijke relatie met een leverancier van het produkt heeft, wordt het produkt met minimale inspanning aangeschaft. Het koopproces wordt nog routinematiger afgewerkt indien de agrariër nauwelijks informatie over een produkt bijhoudt, doordat hij geen produkbetrokkenheid heeft.
Inzake het inkoopgedrag van land- en tuinbouwers is het belangrijk om een onderscheid te maken tussen *produktkennis* en *koopkennis*. Produktkennis heeft betrekking op de cognitieve representatie van informatie over het produkt en kan worden verkregen door voortdurend informatie over het produkt bij te houden. Deze kennis bevordert de verwerking van nieuwe informatie gedurende het koopproces. Aan de andere kant is er koopkennis: de cognitieve representatie van hoe een produkt gekocht dient te worden die gebaseerd is op koopervaring. Meer koopkennis leidt tot vereenvoudiging van het koopproces. Dus het effect van koopkennis is tegengesteld aan dat van produktkennis.

De kooppstructuur op agrarische bedrijven

De resultaten met betrekking tot het koopproces komen aan de orde in hoofdstuk 9 en 10. In het algemeen worden koopbeslissingen op agrarische bedrijven door één of twee personen genomen. Koopstructuren op agrarische bedrijven worden in belangrijke mate door bedrijfskenmerken bepaald. De belangrijkste resultaten met betrekking tot de koopstructuur kunnen als volgt worden samengevat:

Bedrijfskenmerken

- Het aantal gebruikers is een belangrijke determinant van gezamenlijke besluitvorming bij de aanschaf van een produkt en de omvang van het koopcentrum. Participatie in het bedrijf en verantwoordelijkheid voor bepaalde bedrijfstaken bevorderen betrokkenheid van bedrijfsleden bij de koopbeslissing.
- Gezamenlijke besluitvorming en de omvang van het koopcentrum worden voorts bepaald door de aanwezigheid van een maatschap. De agrariërs in een maatschap beslissen doorgaans gezamenlijk en andere bedrijfsleden worden nauwelijks bij de besluitvorming betrokken.

Produkt- en persoonskenmerken

- De invloed van produktkenmerken op de koopstructuur is minder groot dan verwacht. Alleen het financieel belang van een produkt heeft enige invloed op de koopstructuur van agrarische bedrijven. Gezamenlijke besluitvorming komt vaker voor wanneer agrariërs produkten kopen die financieel belangrijk zijn voor het bedrijf. De invloed van koopervaring, als een persoonskenmerk, op de gezamenlijke besluitvorming en de omvang van het koopcentrum is niet significant.
- De invloed van een bedrijfslid in het koopproces is afhankelijk van de mate waarin hij/zij het produkt gebruikt, het aantal uren dat hij/zij meewerkt in het bedrijf en de positie van het individu in het bedrijf.

Op basis van deze resultaten kunnen we concluderen dat met name variabelen waarmee een agrarisch bedrijf getypeerd kan worden, de koopstructuren van agrarische bedrijven bepalen. De verdeling van verantwoordelijkheden en bevoegdheden over de verschillende bedrijfsleden zijn hierbij cruciaal. Vooral bij maatschappen bestaan koopcentra vaak uit minimaal twee leden, omdat dan het bedrijf wordt geleid door twee agrariërs, die beiden meewerken in het bedrijf en het produkt gebruiken. Koopstructuren op agrarische bedrijven zijn tamelijk onafhankelijk van de koopsituatie.

Leverancierstrouw van agrariërs

De resultaten met betrekking tot de leverancierstrouw van agrariërs komen aan de orde in hoofdstuk 11. Het koopgedrag van agrariërs wordt over het algemeen gekenmerkt door veel herhaalaankopen. Vaak kopen agrariërs herhaaldelijk hetzelfde produkt bij één leverancier en tevens kopen zij veelal een assortiment bestaande uit verschillende produkten bij dezelfde leverancier. Bij duurzame produktiemiddelen is de gemiddelde duur van een relatie 13.5 jaar en 77% van de ondervraagde agrariërs heeft tenminste één ander produkt bij dezelfde leverancier gekocht als het produkt waarop de vragenlijst betrekking had. Bij grond- en hulpstoffen is de gemiddelde duur van een relatie 16 jaar en 74% van de ondervraagde agrariërs heeft tenminste één ander produkt bij dezelfde leverancier gekocht als het produkt waarop de vragenlijst betrekking had.
Gegeven het feit dat agrariërs herhaaldelijk bij dezelfde leverancier kopen, dachten we op basis van de koopgedragsliteratuur twee typen leverancierstrouw te vinden. In ons onderzoek vonden we echter drie typen leverancierstrouw, die we kort zullen toelichten:

Werkelijke leverancierstrouw (True vendor loyalty)
Agrariërs met werkelijke leverancierstrouw doen herhaalinkopen bij dezelfde leverancier en hebben een sterke binding met hun leverancier opgebouwd. Hoge veranderingskosten en -risico's zijn belangrijke redenen voor werkelijke leverancierstrouw. Veranderingskosten zijn de kosten die gepaard gaan met het veranderen van leverancier. Deze kosten ontstaan doordat gedane investeringen in een persoonlijke relatie met een leverancier en/of fysieke investeringen bij een leveranciersverandering hun waarde verliezen. Veranderingskosten nemen over het algemeen af naarmate een produkt langer op de markt is, als gevolg van een toenemende standaardisatie. Zowel een lage marktpenetratie als een persoonlijke relatie met een leverancier hebben een positieve invloed op werkelijke leverancierstrouw.
Werkelijke leverancierstrouw wordt tevens bepaald door een relatief beperkte koopervaring en een hoog kwaliteitsbewustzijn van de agrariër. Deze twee persoonskenmerken veroorzaken dat agrariërs onzeker worden over de gevolgen van een leveranciersverandering (veranderingsrisico). Kwaliteitsbewuste agrariërs met weinig koopervaring vermijden daarom leveranciersveranderingen.

Onechte leverancierstrouw (Spurious vendor loyalty)
Ondanks het feit dat agrariërs met onechte leverancierstrouw herhaaldelijk bij dezelfde leverancier kopen, hebben zij geen sterke binding met de leverancier.

Hoewel in de koopgedragsliteratuur inertie van de koper als verklaring voor onechte leverancierstrouw wordt aangevoerd, worden agrariërs met onechte leverancierstrouw juist gekenmerkt door een actieve houding naar de inkoopmarkt. Deze agrariërs trachten te voorkomen dat zij afhankelijk van één leverancier worden en zij willen daarom de flexibiliteit hebben om naar een andere leverancier te gaan. Agrariërs met onechte leverancierstrouw besteden veel tijd en moeite aan het vergelijken van alternatieven en zijn relatief jong. Onechte leverancierstrouw komt weinig voor indien de agrariër grote kooprisico's ervaart.

Gedragsmatige leverancierstrouw (Behavioral vendor loyalty)
De agrariërs met gedragsmatige leverancierstrouw onderscheiden zich van de andere agrariërs door een extreem hoge mate van herhaalaankopen. Deze agrariërs besteden nauwelijks aandacht aan de inkoop van landbouwproduktiemiddelen. Het gedrag van deze agrariërs wordt gekenmerkt door gewoonte. In feite is het koopgedrag van deze agrariërs het meest passief. Zij willen in feite hun gemaakte keuze niet heroverwegen (gemak). Agrariërs met een gedragsmatige leverancierstrouw zijn relatief oud en zij kopen hun grond- en hulpstoffen vooral bij aan- en verkoopcoöperaties.

Samenvattend, een bepaald type leverancierstrouw hangt af van produktkenmerken (kooprisico) en persoonskenmerken en de aard van de relatie met de leverancier (persoonlijke versus zakelijke relatie). Veel kooprisico als gevolg van weinig koopervaring, een hoog kwaliteitsbewustzijn en het kopen van produkten met een lage marktpenetratie gecombineerd met een persoonlijke relatie met een leverancier hebben een positieve invloed op werkelijke leverancierstrouw. Daarnaast zijn agrariërs met onechte leverancierstrouw meestal jong. Deze agrariërs geven er de voorkeur aan om flexibel ten opzichte van hun leverancier te blijven. Tenslotte zijn agrariërs met gedragsmatige leverancierstrouw relatief oud. Deze agrariërs blijven trouw aan een bepaalde kooproutine die moeilijk te veranderen is.

Algemene conclusie

In hoofdstuk 12 wordt een samenvatting van de belangrijkste bevindingen gegeven, die tevens in een bredere context worden geplaatst. Een aantal implicaties van de bevindingen worden genoemd en tevens worden enkele suggesties voor verder onderzoek gedaan. In dit hoofdstuk wordt eveneens op basis van de resultaten uit het onderzoek het koopgedrag van agrariërs in algemene zin getypeerd.
Het inkoopgedrag van agrariërs wordt extrinsiek gemotiveerd. De agrariër waardeert primair de uitkomsten van zijn koopbeslissingen en niet de wijze waarop de koop-

beslissing tot stand kwam en/of andere ervaringen met het produkt zelf. Daarnaast is de inkooptaak slechts één van de vele managementtaken waarvoor een agrariër verantwoordelijk is, terwijl het een hoofdtaak is voor een inkoper van een organisatie. De tijd die een agrariër besteedt aan koopbeslissingen, gaat daarom ten koste van de uitvoering van andere managementtaken.
Deze twee aspecten van het inkoopgedrag van agrariërs, te weten extrensieke motivatie en inkoop als een partiële managementtaak, bepalen dat een agrariër efficiënt tracht in te kopen. Hij wenst een maximaal resultaat in zo min mogelijk tijd te realiseren. Vereenvoudiging van de koopbeslissing en tijdsbesparing zijn daarom belangrijke onderliggende drijfveren van het koopgedrag van agrariërs. Het inkoopgedrag van agrariërs wordt daarom in algemene zin gekenmerkt door een streven om koopbeslissingen te vereenvoudigen en tijd te besparen. Produkten worden vaak achtereenvolgens bij één leverancier gekocht en verschillende produkten worden eveneens bij dezelfde leverancier gekocht (leverancierstrouw). Daarnaast neigen agrariërs ertoe om hun koopprobleem door middel van een leerproces te vereenvoudigen. Agrariërs komen snel tot een beslissing in het geval van bekende produkten en bekende koopsituaties, terwijl men zorgvuldig te werk gaat als er innovatieve produkten worden gekocht en in het geval van onbekende koopsituaties (weinig koopervaring). Tevens kan worden vastgesteld dat er minder alternatieven worden geëvalueerd indien men een persoonlijke relatie met een leverancier heeft. Tenslotte bestaat het koopcentrum op agrarische bedrijven over het algemeen uit één of twee personen.

Ons onderzoek heeft duidelijk gemaakt dat het voorgestelde model een zinvol instrument vormt voor de analyse van het inkoopgedrag van land- en tuinbouwers. Het inzicht in een aantal relaties van het model kon door ons empirisch onderzoek worden verdiept. Niettemin zijn een aantal onderzoeksvragen met betrekking tot het inkoopgendrag van agrariërs niet onderzocht. Onze studie sluit dan ook af met een aantal suggesties voor vervolgonderzoek.

CURRICULUM VITAE

Maarten Kool werd geboren op 18 september 1964 te Linschoten. In 1982 behaalde hij het VWO-diploma aan de Rijksscholengemeenschap "F.A. Minkema" te Woerden. In datzelfde jaar begon hij met de studie Agrarische Economie aan de Landbouwuniversiteit. Deze studie werd in juni 1987 afgerond met als afstudeervakken Marktkunde en Marktonderzoek en Bedrijfskunde. Van september 1987 tot november 1991 was hij als assistent in opleiding verbonden aan de vakgroep Marktkunde en Marktonderzoek van de Landbouwuniversiteit. Van januari 1990 tot september 1991 was hij tevens 20% werkzaam bij Lavecom Automation. Hij was universitair docent verbonden aan de vakgroep Marktkunde en Marktonderzoek van de Landbouwuniversiteit van november 1991 tot april 1994. Vanaf april 1994 is hij werkzaam bij Henkel-Ecolab.