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Analyzing changes in contractual practices in the Louisiana nursery industry

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ANALYZING CHANGES IN CONTRACTUAL PRACTICES IN THE LOUISIANA NURSERY INDUSTRY

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Abstract

The flow of nursery products through the different market channels has changed over the past decade. As mass-merchandisers' market share increased, buyers of nursery product imposed conditions on nursery growers in terms of their business practices as well as the presentation of the product itself. This study analyzed changes in contractual terms between buyer and sellers for two market channels; mass-merchandisers and garden centers. The items evaluated were that product information tags be applied, barcode stickers be applied, special containers be used, transportation to retailer be paid by the seller, returnable shipping equipment be supplied by the grower, on-time delivery be guaranteed by the grower, unsold merchandise be taken back by the grower, some minimum volume be supplied by the grower, and continuous inventory replenishment be used. Data were collected via mail using the Ornamental Horticulture Producer Survey, and non-respondents were contacted by telephone or additional mailings of the questionnaire. The resulting data were compiled and tabulated for the statistical analysis. A McNemar's test was conducted to evaluate whether proportions of items required by the buyer to be included in the terms of a contract had changed from 1996 to 2001 within the two market channels. A model was designed for each of the aforementioned nine items to determine which business characteristics of the grower were associated with him/her accepting the terms imposed by the buyer, by market channel. Analysis of the dataset indicated that, over the time period of the study, more items were included in the terms of contract in 2001 than in 1996. New practices in the nursery industry appear to be led by mass-merchandisers, while the garden center channel follow suit. The level of technology, specifically Internet use, was found to be closely related to the inclusion or exclusion of items in the terms of contracting.

Chapter 1. Introduction

According to the Economic Research Service (ERS) of the USDA, the nursery and greenhouse industry comprises the fastest growing segment of U.S. agriculture. For instance, while the number of farms of all types has declined over the last two decades, the number of nursery and greenhouse farms has increased. In 1997, the industry as a whole had sales of $10.9 billion, up 43% from 1992. Of 18,860 farms, 650 (or 3.5%) had sales over $1 million.

The nursery and greenhouse industry is an important economic component of U.S. agriculture, and also of Louisiana's agriculture. From 1990 to 1998, consumer spending on lawn and garden products at the national level jumped from $20.8 billion to $30.2 billion, which on average is an increase of little over $1 billion per year (National Gardening Survey, 1999). Furthermore, in 1998, it is estimated that 65% of all U.S. households purchased nursery products. The U.S. is the world's largest producer and market for nursery and greenhouse crops. These crops represent an important and unique segment of agriculture whose impact is felt at national, state and community levels (ANLA, http://www.anla.org).

In terms of economic output, nursery and greenhouse crops represent the second most important sector in U.S. agriculture (ERS, 1999). In terms of total farm cash receipts for all commodities in 1998, the industry ranked seventh in the country, while in Louisiana the industry ranked eleventh among all cash crops.

According to ERS data, the nursery and landscape services industries together employ over 600,000 workers during peak seasons. U.S. nurseries directly employ an estimated 40,000 workers all year round, while roughly 105,000 people are seasonal workers.

Nursery production in the United States is categorized either as environmental horticulture or as floriculture. Whereas environmental horticulture involves growing trees, shrubs

and other plants that are typically grown outdoors, floriculture includes cut flowers, potting flowers and other plants typically grown in a greenhouse environment.

1.1. Problem Statement

In order for the Louisiana nursery industry as a whole to cope with the fast pace of industry change, participants must gain a thorough understanding of the different forces shaping the way in which the different players in the industry do business. With recent changes in the share of nursery products flowing through different market channels, it is important for stakeholders to understand that, while some market channels are growing more important, others are not keeping pace. Specifically, mass-merchandisers are gaining market share at the expense of alternative market channels (Hampton, 2001). This observed phenomenon might create potential problems in terms of buyer concentration, for example. Under perfect competition, the large numbers of buyers and sellers does not allow a single market participant to influence other players in the market. On the other hand, a situation where there is a large number of sellers and a single buyer is known as monopsony. The current situation in the nursery industry seems to be in between perfect competition and monopsony, and seems to be moving toward the latter. As concentration among buyers increases, the issue of market power comes into play. If buyer concentration is high and there is a large number of sellers, the market power balance favors the buyer in the sense they can take advantage of the power gained as a consequence of their own growth, which changes the structure of the industry itself. A likely result of the monopsonistic situation would be that producers receive lower prices for their products. At the same time, the final consumer would not receive any price reductions stemming from the reduced price paid to producers, and retailers will receive a higher share of the “value-added”. As can be seen,

economic theory suggests that society's welfare as a whole is reduced by this evolution of the industry towards higher buyer concentration.

In addition to the possible price reduction to producers, there are other issues that come into play. As the market power of retailers increases, so does their ability to impose conditions on producers, such as the items included in the terms of contract. In general, it is the norm to include price, quantity, and quality specifications in a contract, but retailers with some degree of market power may also include other items, such as requiring that the grower pay transportation to the retail outlet, that returnable shipping equipment be used, that deliveries are made at a specific time, or that products be packaged/tagged as specified. The situation is similar to the produce industry, where retailers impose a set of "performance guidelines" on their suppliers, which may appear as specific items in the terms of contract (FreshTrack, 2001).

The concept of contract is well established in law. In the nursery and some others, however, business agreements commonly are verbal rather than written contracts. This arrangement is related to characteristics of the industry. Among these are perishability, absence of well defined grades and standards for contract enforcement, and the general absence of publicly traded markets. Without these, price information is less reliable. As a result, the business relationship between seller and buyer is less formal. The contract is verbal and flexibility is assumed, mitigating risk on both sides of the trade. In agriculture, output can vary significantly based on weather events, and buyers may accept the explanation that failure to deliver was beyond the grower's control. In such a case, the seller might not face legal action. On the other hand, buyers may place 'orders' for product at a given price, but if demand changes and more or less product is needed, the agreed-upon quantity may be adjusted. In addition, price

may be flexible, as when supply and/or demand fluctuate and the parties agree to changes to complete the transaction.

While some industry transactions are under written contracts, the term as used in this study refers to the common, verbal, flexible agreement. In the past, the agreement included price, a and quantity, and some growers used the offer of delivery within some specified distance as a way to differentiate themselves from other sellers . In this study, we are interested in relatively recent additions to these standard terms of the contract. These additions might be thought of as conditions of sale. They are additional services or activities now required of the seller that in the past had been performed by buyers. The transfer of responsibility for these activities and services may be a manifestation of market power as the disparity in size between seller and buyer increases.

1.2. Problem Justification

Many industrial organization specialists mention the degree of vertical coordination within an industry as one of the most important elements of market structure. The presence of vertical integration as a structural feature of American industry is a result of the fact that all markets are not perfectly competitive and/or that the costs of using competitive market processes are not zero (Tucker and Wilder, 1977). In general, it is understood that some form of integration will occur when cost reduction through integration is possible. Historically, open markets have been the nexus between input suppliers, producers, processors, retailers, and consumers. In several industries within the agricultural sector, there are examples where spot markets have been replaced by vertical coordination of some sort. Some examples of highly integrated sectors are the poultry and pork industries. It is not known with certainty where the nursery industry is headed. However, while the consolidation and integration processes should be somewhat similar

across all industries, it will not be the same because each industry has its own characteristics. Contracting is a form of coordination. A literature search suggests that no work has been done to study contracting practices within the nursery industry. From the scientific and academic standpoints, it is very important, for future reference, to document the ongoing processes in the nursery/grower industry in Louisiana. According to the USDA, the nursery and greenhouse industry comprises the fastest growing segment of U.S. agriculture, which suggests that there is a continuous need for current and quality information on the industry.

Another important reason for doing the study is to allow policymakers to get a clear picture of the current situation and outlook for the green industry in Louisiana. Policymakers will make better decisions concerning society's welfare if they have updated, quality information.

Researchers and scholars are concerned that highly consolidated or highly integrated industries threaten the economic viability of the independent producer or independent processor (Lawrence et al., 1997). This concern stems from the argument that vertical integration may lead to market foreclosure, a situation in which independent producers no longer have viable open markets through which to sell their products (Salinger, 1998). The evolution of agriculture towards "industrialization" presents a problem for policymakers, who must weight the benefits of "industrialization" against its drawbacks.

The Louisiana nursery industry has experienced significant change over the last fifteen years. Particularly, changes in retailing practices, and strategies pursued by retailers fuel changes in the nursery industry as a whole. In the past, nurseries have been affected by changes in the type and size of retailer operations. In theory, large mass merchandisers would prefer to do business with large nursery growers that are able to supply them with all the products their clients demand and at reduced costs. However, reality poses a potential problem for retailers of

nursery products, since there are not many nurseries or growers that handle sufficient volume to supply mass-merchandisers by themselves. In other words, retailers would prefer to deal with fewer suppliers rather than with many because transaction costs usually increase with a larger number of suppliers. This situation creates the incentive for mass-merchandisers to enter into partnerships or agreements with a few nursery firms, because it lowers transaction costs for the retailer and allows nurseries to grow with the retailer. Then if the grower sells to these large businesses, he finds himself dealing with a buyer who has substantially more influence on the terms and conditions of sale compared to buyers from other channels.

Special emphasis will be placed on the different business and general characteristics of firms to see if these characteristics have any effect on growers accepting buyer conditions in contracting practices. The study should be beneficial for growers in Louisiana because it will show producers how other firms work within the same industry, and the study will identify contracting practices according to the selected marketing channel usage. It is important to note that many growers might not be able to cope with the fast pace at which changes occur within the industry. The speed of industry change challenges management, and current information is hard to find. This creates a need for accurate and good quality information for stakeholders within the industry. The major sources of information for producers are trade shows, journals, fellow growers and the market itself. This study will give growers an updated set of industry averages and benchmarks on factors such as proportion of sales contracted and average overall sales, and will assist the decision-marker in each firm to identify the current trends within the industry. In addition, everyone in the industry will get to know the most recent practices adopted by fellow growers, such as supply chain management and electronic purchasing.

At this point it's important to note that no attempt will be made to conduct an in-depth analysis of the performance measures of the industry. For instance, the fact that the industry does not have grading or quality standards for its products makes it difficult to collect consistent price information.

Chapter 2. Objectives

The main objective of this study is to investigate the extent of change in the relationship between nursery growers and buyers with respect to changes in the conditions of sale in addition to specified price and quantity. In order to accomplish the main objective, the following specific objectives will be achieved:

1. To evaluate changes in the terms of the contract between nursery growers and buyers of their products across selected marketing channels.

    I) Determine whether the individual terms of contracting between nurseries and buyers have changed between 1996 and 2001.

    II) Devise an aggregate measure of change within the time frame of the study to evaluate if, considering all the items together, significant changes in the terms of contracts have occurred.

2. To analyze whether the business and general characteristics of Louisiana nursery firms have an effect on the inclusion of the different items in the terms of a contract.

    I) The inclusion of the items in the terms of a contract will be explained using the individual contract terms as the dependent variable in an explanatory model.

2.1. Literature Review

2.1.1. Vertical Coordination

It has been widely argued that agriculture is also undergoing a process of vertical coordination with allied industries, and that, consequently, control of agriculture in the future may not rest within the industry itself (Trifon, 1959). There will be more reliance on vertical integration and contract production and producers will be less independent than today's farmer (Harryman, 1994). According to Hobbs and Young (1999), the agri-food sectors of Canada and

the United States are witnessing moves towards closer vertical coordination. This is occurring to varying degrees in the different industries, taking on a variety of forms, and involving a diversity of supply chain partners. Some industries, notably the U.S. poultry industry, developed tight vertical coordination some time ago. In other sectors, it's a relatively recent phenomenon.

The definition of vertical coordination provided by Mighell and Jones (1963) is the following: "…includes all the ways of harmonizing the vertical stages of production and marketing. The market-price system, vertical integration, contracting and cooperation singly or in combination are some of the alternative means of coordination."

To date, research about these changing modes of coordination appear to have largely focused on either (1) developing a better understanding of the characteristics and motivations of an individual mode of coordination, or (2) understanding the broad differences between external (market) and internal (contract/ownership) approaches to vertical coordination (Peterson and Wysocki, 1997)

Another definition of vertical integration is "the alignment of direction and control across segments of a production/marketing system" (King, 1992). And generally, the factors that are aligned and controlled are price, quantity, quality and terms of exchange (Sporleder, 1992). From the theoretical point of view, the coordination continuum runs from open markets to complete vertical integration. In spot markets, price and broadly accepted performance standards determine the nature of the exchange. In a framework of perfect competition neither party can influence price nor the general standards and both buyer and seller must agree if an exchange is to occur. In the case where perfect competition does not hold, there will be some market power that gives an advantage to one of the parties involved. To the actor with market power, some level of control will be internal to the exchange relationship. However, note that the party

lacking market power can, in some cases, walk away from the transaction. The general characteristics of transactions in the spot market include: (i) motivation by self-interest only, (ii) short-term relationships, (iii) a high level of opportunism, (iv) limited information sharing, and (v) flexibility and independence stemming from the use of the spot market itself.

On the other hand, the other end of the continuum is vertical integration, which may not be defined by single ownership, but it can be defined by centralized control. For instance, if a corporation operates at multiple levels in a production/marketing chain through single ownership, it does not necessarily mean the corporation is vertically coordinated. It might be that the different business units are allowed to operate autonomously (Peterson and Wysocki, 1997). As defined by the authors, vertical integration is a mechanism that relies upon total centralized control to achieve coordination. The characteristics of transactions in a vertically integration system are: (i) mutual interest for both parties involved, (ii) a more long-term relationship, (iii) that both parties benefit from vertical integration, (iv) free information flow from party to party, (v) that integration gives both actors more stability, and (vi) that it builds on the idea that both parties are interdependent on one another.

In their work, Peterson and Wysocki (1997) present five major categories of vertical coordination strategies, ranging from spot markets to vertical integration. We are now familiar with the two extremes of the continuum, but we need to explore the "in-betweens". Moving from spot markets, the next step in the continuum is contracting. In general, it can be said that there are two subcategories within the contracting category: (i) market contracts and (ii) production contracts. Market contracts are generally extensions of the spot market (Rehber, 1998) in that they specify only market characteristics, such as price, quantity, time of delivery, and quality, but they do not specify production practices. On the other hand, production contracts specify

production practices and cultural practices, among others (Hudson, 2000). It's clear that production contracts are a type of quasi-integration whereby the contractor gains some control over the production process of an upstream firm without having to take ownership of the firm (Blois, 1972; Monteverde and Teece, 1982).

The third portion of the continuum is the strategic alliance. It can be defined as an exchange relationship in which firms involved share risks and benefits emanating from mutually identified objectives (Peterson and Wysocki, 1997). Martin et al. (1993) maintain that it must exhibit the following three characteristics: mutuality in objective identification, mutuality in controlling decision making processes, and mutuality in sharing risks and benefits. In a strategic alliance, parties maintain their separate identity but agree to work closely together to attain a common goal. In strategic alliances, the coordination mechanisms rely mostly on internal control as opposed to external control (which is the case for spot markets and contracting).

According to Peterson and Wysocki (1997), formal cooperation is the fourth position along the continuum. It is designed to include a mixture of organizational forms that include joint ventures, partial ownership relationships, clans, and other organizational forms that involve some level of capital commitment between the parties. The presence of a formal organization having its own identity marks this fourth stage of the continuum, which is also characterized by the presence of an organizational structure that allows some form of true internal control as policies and procedures are put in place for an exchange between the parties to take place.

There are many reasons why firms may choose one or several coordination mechanisms, and the question is why and how companies come up with a given exchange strategy. Mahoney (1992) provided theoretical derivations of eight coordination strategies based on three conditions

that he argues are sufficient to specify coordination mechanisms. These conditions are: (i) task nonseparability, (ii) task programmability, and (iii) asset specificity.

In situations with low task nonseparability, the contributions of individuals can be clearly separated through output measurement; therefore, individual rewards can be fairly distributed and a manager is not required to monitor shirking. On the other hand, in situations with high task nonseparability, the contribution of individual efforts can not be clearly separated through output measurement; therefore, individual rewards can not be fairly distributed without a manager to monitor shirking.

Low task programmability occurs when the product transformation process is not well established or routine; therefore, input measurement is uncertain and not amenable to monitoring. Conversely, in high task programmability the product transformation process is well established or routine; therefore, input measurement is fairly certain and amenable to monitoring.

The last item, asset specificity refers to the degree to which particular assets (human, physical, and/or site investments) are fixed in a particular mode of production or current enterprise (Hudson, 2000). In instances where low asset specificity is observed, investments are not particularly firm/strategy specific. In other words, the resources are productive in alternative applications, and may be moved with little or no loss of capital. The opposite is true for high asset specificity. For instance, if an asset is not easily converted to other uses, the owner is forced to seek alternative arrangements that put the asset into use up to the point at which the returns equal the cost of converting the specific asset to another use.

Other authors have quite similar but distinct views on the motives leading a firm to vertically coordinate. Hudson argues that six variables help explain the degree of vertical

integration a firm chooses. The variables are: (i) transaction costs, (ii) asset specificity, (iii) risk, (iv) demand assurance, (v) access to capital, and (vi) autonomy.

Transaction costs can be classified into three major categories- information, negotiation, and monitoring and enforcement costs (Hobbs, 1996). Information costs arise from assessing the reputation of possible trading partners, establishing a price and becoming familiar with quality standards. Negotiation costs are costs that arise from negotiating contracts, arranging the legal documents, and arranging for physical delivery of the product or products. After the transaction takes place, monitoring and transaction costs come into play, and involving that the other party honors the agreed upon conditions of exchange (Hudson, 2000).

In papers discussing various forms of vertical coordination, risk plays an important role. For the agricultural producer, risk comes in various fashions; yield, price and financial. Louisiana nursery firms face a particular form of risk that is associated with the market channel choice. Mass-merchandisers are increasing their market share of nursery products, and producers not selling to them face the risk of being left out of the growing marketing channel segment. In other words, producers not only must evaluate the different aspects of selling their product, such as price, quantity, and quality, but must also take into account risk levels associated with choosing a particular marketing channel. On one hand, mass-merchandisers are an attractive channel because of increasing market share, but they tend to demand more concessions than the other marketing channels. On the other hand, it also gives the producer the possibility of growing alongside the retailer. Another option would be to seek alternative marketing channels that would demand fewer concessions and exert less market power, but do recognize that growth possibilities are somewhat lessened by the nature of these retailer operations.

Demand assurance, from the producer standpoint, relates to risk in the sense that uncertainty about buyers can induce sellers to seek out different forms of integration to assure buyers for their output. On the other hand, buyers want to be assured that they have a steady supply of product throughout the production process (Hudson, 2000).

Access to capital is a key factor in agricultural production. Increasing costs have placed a burden on agricultural producers to secure sufficient capital to run a production operation. For example, forward pricing and contract production may improve access to capital by assuring lenders of prices the producer is going to get, as well as who is going to buy from them (Knight et al., 1989). Thus, the greater the need for capital, the more incentive there will be for vertical coordination of some form.

Autonomy may be seen as a factor that decreases contracting as opposed to increasing contracting (Gillespie and Eidman, 1998). The term clearly refers to the ability the producer has to make independent production/marketing decisions.

In the nursery/grower industry in Louisiana, contracting plays an important role in vertical coordination. For instance, 23% of growers reported contract production and the share of total annual sales attributed to contract production was the highest of all the surveyed states (Brooker et al., 1998). Very little has been published about the different means through which nursery/growers vertically coordinate production. To further explore the contracting phenomenon in the nursery/grower industry it, might be appropriate to mention the most common types of contracts found in the agriculture sector:

(i) Cash forward contracts: these are the simplest form of market contract specifying a given price, quantity, and delivery location and time. Sometimes these types of

contracts also specify quality. Under this arrangement, the producer is guaranteed a price and a buyer.

(ii) Basis contracts: under this arrangement, the contract specifies a basis level (which is the difference of the futures price and the cash market) as the pricing mechanism as opposed to a fixed price. These contracts provide the producer with some price protection and also the producer has the option of when to price his/her crop (Wisner and Kordick, 1996).

(iii) Call contracts: these contracts operate similarly to basis contracts, but the difference lies in that it may be either on a given price level or a basis level, and the producer has the ability to fix the price/basis at any point during the contract.

(iv) Minimum price contracts: the producer is guaranteed a minimum price to sell his/her products, but the producer also has the opportunity to capture favorable price movements if they occur (Waller et al., 1998).

(v) Production contracts: these can be divided into two major categories, which are (i) resource providing contracts and (ii) production management contracts. Resource providing contracts are a relationship between growers and buyers in which the producer uses certain predetermined inputs or resources in the production process. This type of agreement ensures the contractor some control over the production process. On the other hand, production management contracts are some combination of both marketing and resource providing contracts. They typically stipulate production practices and price or returns to growers.

The proportion of buyers/sellers that engage in contracting is expected to change as the nursery industry and the retailers, as well as all the players in the supply chain, strive to cope with an ever-changing environment.

Contracting is only one of the many means by which buyers and sellers can exchange merchandise. However, as is noted in the FreshTrack 2001 report, the buying process is at the center of innovation and technological transformation, propelling future buying and selling into a new age, an age of computers, networks, business-to-business, and worldwide auctions. The same report states that there has been a consolidation in the number of retail produce buyers in the produce industry, particularly among large firms. It is very likely that these changes at the retail level are not only occurring for a given department, but reflect general changes in management practices. The implications of increased buyer concentration pose a potential problem for sellers in terms of market power.

The main outlets for nursery products can be categorized as: (i) mass-merchandisers, (ii) garden centers, (iii) other retailers, and (iv) landscapers. However, there are other players in the supply chain, such as re-wholesalers and brokers, who act as the middlemen between producers and sellers. Some retail operations, such as mass-merchandisers, are not exclusively dedicated to nursery products, for example mass-merchandisers. These retail operations carry a wide variety of other products, which creates an incentive to simplify the way in which business is done with the adoption of new technology. In general terms, some retailers, in particular mass-merchandisers, may be pressuring suppliers to adopt new technology as well as other non-traditional means of conducting business. Some examples are: electronic data interchange (EDI), cross docking, continuous replenishment, returnable containers, performance guidelines, and e-commerce. EDI are bilateral electronic exchanges between retailers and their preferred suppliers.

These systems may be used only for invoicing or for electronic ordering and other procurement activities (ERS, Agricultural Economic Report Number 795).

The flow of nursery products from growers to consumers is not a simple process. There have been many changes in the nursery industry both locally and at the national level over the past decade. It's very important for both buyers and sellers to realize that business transactions, at all levels, are undergoing change and that it is very important to cope successfully with trends in the industry in order to survive.

2.1.2. Past Research and Models in the Ornamental Nursery Industry

The S-103 Regional Research Committee is dedicated to providing information, research and analysis of growing sectors of horticulture and floriculture. The committee has sponsored three Trade Flows and Marketing Practices surveys, which aim at providing primary information from the nursery industry at the national level. Brooker and Turner did the first Trade Flows and Marketing Practices survey in 1990 (Brooker and Turner, 1990). In the study, nursery growers across the US were asked to provide information on general and specific aspects of their business, for example: types of plants produced, transaction methods used, price determination practices and advertising expenditures. Of the surveyed firms in Louisiana, about 55.8 % were sole proprietors, 9.6 % were partnerships, and 28.8% were corporations. The remaining 5.8 % were classified into other business arrangements because they didn't fit into the three pre-established categories. In addition, Louisiana's nurseries engaged primarily in evergreen shrubs production and deciduous trees and shrubs, with 57.8 % and 23 % of sales generated by these two types of operation. The other 19.2 % of sales was divided into evergreen trees (7.1 %), vine & ground covers (8.3%), roses (0.3 %), herbaceous perennials (1.4 %), tree fruit (0.3 %), small fruit (0.2%), propagating material (1.2 %), and others (0.3 %).

In addition, 73.6 % of Louisiana nursery sales were to repeat customers, while 81.7 % of sales were carried out at the printed price value. About 96.6 % of sales were wholesale sales, while the remaining 3.4 % represented retail sales. Of the wholesale sales, 20.4 % corresponded to re-wholesaler clients, 33.9% corresponded to landscaper clients, and 45.7 % of sales were made to retailers.

The second Trade Flows and Marketing Practices survey, again, was aimed at collecting information on product flows, sales methods, price determination, transportation, and advertising as well as general business characteristics (Brooker et al., 1993). The second survey was conducted to provide another cross sectional data set five years after the first survey was conducted. By 1993, in the state of Louisiana, sales of deciduous trees and shrubs accounted for 14.2 % of total sales, while sales of evergreen shrubs accounted for 22.6 % of total sales. Evergreen trees accounted for 4.2 % of sales, vines and ground covers 2.8 %, roses 0.9%, herbaceous perennials 0.6 %, tree fruit 0.9 %, small fruit 0.2 %, foliage plants 7 %, propagating material 2.7 %, and others representing 44.3 % of total sales.

In addition, 82.6 % of sales in Louisiana were to repeat customers, up 9 % from the previous survey. Also, of total sales, 91.5 % corresponded to wholesale sales, while the remaining 8.5 % were retail sales. Of the wholesale sales, 11.8 % corresponded to re-wholesaler clients, 24.5 % corresponded to landscaper clients, and 63.7 % of sales were made to retailers. Furthermore, mass merchandisers accounted for 17.1 % of total sales, while garden centers were the most important outlet for nursery products, concentrating 42.2 % of total sales. The remaining 4.4 % of sales went to the other retailer category. Landscapers and re-wholesalers were responsible for 24.5 % and 11.8 % of total sales, respectively. Also, in the state of Louisiana, 37.8 % of sales were contract sales.

The third Trade Flows and Marketing Practices survey was conducted in 1999, under the same general objectives and using a similar format to the previous two studies (Brooker et al., 1999). In the state of Louisiana, about 16.4 % of sales corresponded to deciduous trees and shrubs, while evergreen shrubs represented 14.7 % of sales. Evergreen trees accounted for 7.6 % of sales, vines and ground covers 5.8 %, roses 0.6%, herbaceous perennials 3.6 %, tree fruit 1.2 %, foliage plants 4.9 %, propagating material 7.3 %, and others representing 36.7 % of total sales.

As was reported in previous surveys, the percentage of repeat customers for Louisiana nurseries was relatively high. In the 1999 survey 78.2 % of respondents reported making sales to repeat customers. Among survey respondents, the average percentage of total sales that were wholesale was 77.3 %, while the remaining 22.7 % were retail sales. Furthermore, segmenting total wholesale sales into the respective marketing channels shows that mass merchandisers represented 10.4 % of total sales, down 6.7 % from the previous survey. Garden centers were responsible for buying 29.8 % of total sales by nurseries, 12.4 % down from the previous survey. Other retailers gained importance according to the 1999 TFMP survey, since they doubled their purchases from 4.4 % of total sales to 8.8 % of total sales. Both landscapers and re-wholesalers gained market share, by 5.9 % and 8.8 % of total sales, respectively, yielding 30.4 % of total sales to landscapers and 20.6 % of total sales to re-wholesalers. In addition, for the state of Louisiana, 32.5 % of sales were reported to be contract sales, down by 5.3 % of the total given in the previous TFMP survey.

Hampton (2001) created econometric models based on data obtained from the third TFMP. One of his objectives was to use business characteristics of nurseries to explain marketing channel choices of Louisiana wholesale nursery growers. It's important to note that

nurseries were divided into two distinct categories based on dollar sales. All nurseries having less than $200,000 in sales were considered "small" nurseries, while nurseries having more than $200,000 were classified as "large" nurseries. Hampton had a set of five limited dependent variables, which are proportion of sales going to: (i) mass merchandisers, (ii) garden centers, (iii) re-wholesalers, (iv) landscapers, and (v) other retailers. The value of any given channel could range from 0 to 100, and the sum of all the proportions of all channels must yield 100, since the proportions are reported as a percentage of sales going to each of the named market channels. The proportion of sales going to each of the five market channels was hypothesized to be a function of: acres, advertising expenditure, age, computerization, contract sales, in-person sales, in-state sales, repeat customer sales, telephone sales, use of four or more channels, and the error term. Basically, Hampton had one model for each market channel for "small" nurseries, totaling five econometric models that were analyzed separately. The same procedure was carried out for "large" nurseries. Individual ordinary least squares models were run for each marketing channel for "small" and "large" nurseries.

The parameter estimates for small Louisiana nurseries' sales to mass merchandisers were not significantly different from zero. The result was expected since mass merchandisers were not expected to do business with small producers. On the other hand, the parameter estimates for small Louisiana nurseries' sales to garden centers yielded several significant variables. First, "contracted sales" were significantly different from zero and had a negative impact on the percentage of sales to garden centers. For example, an increase in contracted sales of $100,000, on average, would result in a decrease in the percentage of sales by small nurseries to garden centers by .334. Second, the variable "in-state sales" was significantly different from zero in the small nursery model. The effect of this variable was positive, meaning that an increase of

$100,000 in-state sales would increase small nursery sales by 0.276. Finally, "sales to repeat customers" was significant and positive. For instance, an increase in sales to repeat customers of $100,000, on average, would result in a 0.206 increase in small Louisiana nursery sales to garden centers. Results of OLS estimation for small nurseries to "other retailers" didn't yield any significant variables, while the OLS estimation for small nursery use of the landscaper channel yielded one significant variable: age. According to Hampton, one of the possible reasons why the variable age is significant and negatively related to the landscaper marketing channel is that initially, new nurseries try to maximize sales to garden centers and landscapers because those channels offer the greatest profitability to small growers, and they tend to make less request for special arrangements. Finally, the last model within the small nursery category is the re-wholesaler model. "Contract production" had a significant and positive effect on the percentage of sales to re-wholesalers. For example, an increase in contract sales of $100,000 would result in a 0.693 increase in small Louisiana nursery sales to re-wholesalers. Also, the variable "in-state sales" had a significant and negative effect on the percentage of sales to re-wholesalers. On average, an increase in in-state sales of $100,000 would result in a decrease of 0.433 in small nursery sales to re-wholesalers.

The parameter estimates for large Louisiana nurseries' sales to mass merchandisers yielded two significant variables: contracted sales, and use of four or more marketing channels. Contracted sales had a positive impact, meaning that an increase in contracted sales of $100,000 would result, on average, in an increase in the percentage of sales by mass merchandisers by 0.025. Also, the use of four or more marketing channels resulted in a value of 16.8 %. Hampton suggested that the result implied that the mass merchandiser market channel was the least preferred by growers. A reason for this is that mass merchandisers and growers are not at the

same level in terms of market power. On the other hand, the OLS model for large Louisiana nurseries' sales to garden centers resulted in three significant variables: computerization, contracted sales, and in-state sales. Contracted sales had a negative effect on the percentage of sales going to garden centers. The reason for this is that alternative marketing channels are more receptive to contracting than garden centers. In-state sales had a positive impact on the percentage of sales to garden centers. For example, an increase in in-state sales of $100,000 resulted, on average, in an increase of sales to garden centers of 0.017 %. According to the author, this result was expected since garden centers are generally local businesses, typically in close proximity with the nurseries that supply them. The OLS estimation for the large Louisiana nurseries' sales to "other retailers" resulted in one significant variable; contracted sales. The results indicate that an increase in $100,000 in contracted sales would result in an increase in sales to other retailers of 0.032 %. The OLS estimation for the large Louisiana nurseries' sales to landscapers resulted in no significant variables. Finally, the OLS estimation for the re-wholesaler marketing channel yielded several significant variables. First, "computerization" had a negative impact on sales to re-wholesalers, with a coefficient of –13.85 %. Second, a nursery using four or more marketing channels had a negative impact on the percentage of sales to re-wholesalers, with a parameter coefficient of -14.49 %. According to Hampton, a diversification strategy on part of the growers comes at the expense of sales to re-wholesalers. Finally, "in-state sales" had a negative effect on the percentage of sales going to re-wholesalers. A $100,000 increase in sales that are in-state result in a 0.013 decrease in the percentage of large nursery sales to re-wholesalers. This result suggested that Louisiana growers rely primarily on out-of-state re-wholesalers to buy their products.

Chapter 3. Methodology

The target population for the study is Louisiana's commercially sized wholesale nursery firms. The Louisiana Department of Agriculture and Forestry by statute is required to license sellers, and provided the initial list. Very small firms are given a type II license, and they won't be included in this study. Firms with a type II license have less than 200 square feet of greenhouse area for production, or less than 2,500 square feet of nursery farm production space. Firms with over 200 sq. ft. of greenhouse production, or more than 2,500 sq. ft. of field production are given a type I license. Initially, the lists included 541 names of growers and/or firms. However, some firms having a type I license were too small to be considered commercial growers. Additional criteria was developed that removed nurseries having less than 1 acre of field production, less than 0.5 acre of container production, or less than 0.04 acres of greenhouse production. Some additional firms, such as growers who sell their products through their own retail activities, were removed based on comparison with lists used in the TFMP surveys. Some duplicate listing were found and removed. After the different screenings, there were 401 names in the mailing list.

A very important aspect of the study was the development of a survey instrument to collect producer level information on the firm's organization, expenses, revenues, workforce, marketing and technology (Appendix A). In the firm organization section, producers are asked about general characteristics of the firm, such as the acreage devoted to production according to type of product, as well as the age of the business and the legal organization of the business. The sections on expenses and revenues are self-explanatory, although it's important to point out that producers were asked to report sales to the nearest $1,000 instead of checking a category, as was done in the Trade Flows and Marketing Practices survey. When reporting expenses and

revenues, the producer was given a choice of reporting a percentage of sales value or a dollar figure. In the workforce section, producers are asked to provide precise information on the number of employees the firm had, including characteristics of those employees. Some descriptors used to classify employees are; if they are seasonal or full year employees, part time or full time, hired managers, and owners. The marketing section consists of various questions aimed at learning how producers utilize the different marketing channels available to them, as well as getting specific details on the different contract terms that are important. While developing the questionnaire, no previous literature was found indicating the different dimensions, or items, included in the terms of contract between growers and buyers. For that reason, the discovery of the items in the terms of contract was based on the opinions of some nursery growers, the input of LNLA members, experts in the field of ornamental horticulture production, as well as information provided in literature for the fruits and vegetable industries (FreshTrack, 2001). The final consensus was to include nine items in the terms of contract; product information tags, barcode sticker, custom containers, transportation to retailer, returnable shipping equipment, on-time delivery, take-back unsold products, minimum volume, and continuous inventory replenishment. A detailed discussion of these individual items is provided in the methodology section.

Once the questionnaire was complete, it was mailed to five growers as a pre-test. The growers were asked to fill out the questionnaire and were given instructions to provide some feedback in terms of the contents, organization, degree of difficulty, and appropriateness of the survey instrument. The general consensus was that the questionnaire appeared to be lengthy, and some of the tables were confusing for the respondent. Additional efforts were made to reduce the length of the survey instrument and to improve the organization in such a way that it appeared

less complicated to the respondent. However, this procedure was compromised by the fact that the survey included questions that were going to be used for two separate studies. The final questionnaire was therefore, lengthy, despite the efforts made to provide a short and easy survey to producers. In retrospect, this may be one of the reasons for a low rate of response; especially taking into account that in past TFMP surveys the rates of response were considerably higher.

The Dillman protocol was used to increase the survey response rate. Initially, the survey was mailed to 401 producers. The survey packet was made up of the complete questionnaire and two letters. One letter was from the authors, consisting of a brief introduction and instructions, while the other was a letter of support from the industry association (Louisiana Nursery and Landscape Association). For producers who had not responded within two weeks, a reminder postcard was sent. Two weeks after the postcard was sent, a second complete set of survey material was mailed to all producers who had not responded to the questionnaire. Given the low rate of response, telephone calls were made to encourage participation. In addition, follow-up telephone calls were made to nurseries that had incomplete responses to the survey, and they were asked to provide an answer via telephone, fax or as a mail response to a customized questionnaire containing only the items that they had failed to answer.

Many questionnaires were returned indicating that the targeted individual or firm had sales lower than $5,000 a year, or that the nursery sold the products in their own retail outlets. Since these individuals/firms didn't belong to the target population, they were deleted from the list, leaving the target population at 352 firms/individuals. In addition, efforts were made to get input from the ten largest nursery growers in the state. The ten largest nurseries in the state were identified, and if they hadn't responded to the survey, additional telephone calls were made in an effort to get them to cooperate. The total number of responses was 63, but of those, only 38

provided complete responses. Only those individuals with complete responses were used when conducting the statistical analyses. It would have been possible to implement remedies for missing data, but the choice was made to use only observations with complete responses.

3.1. Procedures

3.1.1. Objective One

To evaluate changes in the terms of the contract between nursery growers and buyers of their products across selected marketing channels.

3.1.1.1. Part I

Determine whether the terms of contracting between nurseries and buyers have changed between 1996 and 2001.

3.2. Expectations

3.2.1. Mass-Merchandisers

The null hypothesis is that there is no change in the proportion of each item in the terms of contract between growers and mass-merchandisers. The alternative hypothesis states that there is a significant difference between each item included in the terms of contract in 1996 and 2001.

3.2.2. Garden Centers

The null hypothesis is that there is no change in the proportion of each item in the terms of contract between growers and garden centers. The alternative hypothesis states that there is a significant difference between each item included in the terms of contract in 1996 and 2001.

3.2.3. Discussion

Growers were asked to respond whether a particular item was included in the terms of contract with mass-merchandisers and with garden centers in the years 1996 and 2001. Asking growers to think back five years from the current time to respond to the survey was one of the

key aspects in devising the survey instrument. The ideal would have been to have more than five years between the present and past time, because it would allow more time for changes within the industry to occur. On the other hand, the larger the time elapsed between 2001 and past time, the greater the chance that the responses would not be accurate. Conversely, asking growers to respond for the items included in the terms of contract for a period less than five years would ensure a greater accuracy of the responses, but there probably would be fewer changes over this shorter period of time. As an industry grows and as changes within an industry develop, not all adjustments are made overnight, hence, the choice of the time frame of the study proves to be a critical choice. Ultimately, the TFMP surveys have shown that a timeframe of five years allows for plenty of change in this particular industry.

In order to determine whether the terms of contracting between nurseries and buyers have changed between 1996 and 2001, a McNemar's test will be conducted for each of the items included in the terms of contract to evaluate if there is a change in the proportion of growers having each item in the contract with mass-merchandisers and garden centers. The items in the terms of contract to be evaluated are; product information tags, barcode sticker, custom containers, transportation to retailer, returnable shipping equipment, on-time delivery, take-back unsold products, minimum volume, and continuous inventory replenishment.

Initially, the proposed methodology for conducting the comparison between 1996 and 2001 terms of contract was a dependent t-test. However, a close examination of the methodology suggested violations of the basic statistical assumptions of the proposed test. The most obvious of these was that the variable to be observed was not a metric variable, but a categorical variable. To find alternative means with which to test if changes had occurred between 1996 and 2001, the author chose to examine other statistical methods. One of the possible alternatives was a

binomial test. If the author had chosen this methodology, the responses for the year 1996 were going to be used to determine the expected probability of success, or, in other words, the proportion of inclusions and exclusions. Then, the observations from the year 2001 were going to be tested against the expected probability found in 1996. The shortcoming of this approach is that a sample size accounting for just 10.8% of the target population would not be a good measure of the actual probability of inclusions and exclusions. In other words, there may be large differences between the expected and actual probabilities. Finally, since the sample includes observations for the same subjects for the years 1996 and 2001, it can be said that the responses for both years are dependent; hence methods that treat these two sets of variables as independent may not be appropriate.

The McNemar test is a method that allows for the comparison of two samples when each sample has the same subjects (Agresti, 1996). Another positive aspect of this test is that no assumption regarding the true distribution of inclusions and exclusions is made. In fact, the test measures the change in proportions exhibited by the observations in the sample only. The data are organized in 2 x 2 tables, in which the rows are the response categories for the year 1996, and the columns are the responses for the year 2001. In each given year an item may be present or not. If an item was included in any given year, it's given a value of "1", while if the item was not included in the terms of contract it was assigned a value of "0." The two cells for which the responses are the same in year 1996 and 2001 form the "main diagonal", whereas the two cells for which responses in those given years are not the same form the "off-main diagonal." The two "main diagonals" indicate the number of growers who indicated a given item was not in the terms of contract in 1996 or 2001, and the number of growers who indicated a given item was in the terms of contract for both years, respectively. The first "off-main diagonal" from left to right

gives the cases where a given item was in the terms of contract in 1996 but was not in the terms of contract in 2001. Conversely, the second "off-main diagonal" indicates the number of people that indicated that a given item was not included in the terms of contract in 1996 but was included in the year 2001. The standardized normal test statistic equals

$$Z = \frac{n_{12} - n_{21}}{(n_{12} + n_{21})^{1/2}} \qquad \text{Equation 1}$$

The square of this statistic has a chi-squared distribution with one degree of freedom. This test for a comparison of two dependent proportions is the essence of the McNemar's test. The difference of sample proportions refers to the difference of sample marginal proportions p_{1+} minus p_{+1}, which estimates the true difference π_{1+} minus π_{+1}. The estimated variance of the sample difference equals:

$$\frac{p_{1+}(1- p_{1+}) + p_{+1}(1-p_{+1}) - 2(p_{11}p_{22} - p_{12}p_{21})}{n} \qquad \text{Equation 2}$$

The square root of the estimated variance provides a standard error, used in constructing a confidence interval for the true difference of proportions (Agresti, 1996).

The mass-merchandiser channel was one of the marketing channels to be studied in detail since it's hypothesized that this segment is driving the changes in the nursery industry. For instance, mass-merchandisers have the experience, the setup, the technology, and, in general, the capabilities to introduce supply chain management practices into the green industry. From their standpoint, it's just adding one more type of product to all those they carry already, but from the standpoint of the grower, it's learning a whole new way to do business. Mass-merchandisers are gaining market share rapidly. It is hypothesized that if mass-merchandisers have a higher degree of market power than the other marketing channels then they are able to impose more conditions on growers relative to other marketing channels. This market power stems mainly from the

volume of products sold, making it an attractive outlet for nursery products in comparison to the smaller outlets represented by garden centers. WalMart, for example, is a clear leader in retail sales, as well as in supply chain management. The firm allows suppliers to have full and free access to real-time data on how their products are selling, store-by-store. By sharing information that other retailers jealously guard, WalMart allows suppliers to plan ahead, and ultimately offer better prices (The Economist, 2001). Mass-merchandisers attempt to portray their partnerships with producers as a win-win situation for both the buyer and the seller, making for more efficient supply-chain. Ultimately, the company's leadership in supply chain management is one of the reasons that allows them to be so aggressive in terms of growth. Many important mass merchandisers try to implement systems such as that of WalMart, with varying degrees of success. However, the notion of a faster, leaner and more efficient supply chain has not reached the independent garden center marketing channel, and this may be a reason they are losing market share to other market channels, specifically, mass merchandisers. It is hypothesized that the share of growth mass-merchandisers gain is partly lost by garden centers. On the other hand, independent garden centers may be thought of as the opposite end of the spectrum to mass-merchandisers.

Despite the marked differences between mass-merchandisers and garden centers, it is important to note that growers might not be able to negotiate at the same level with garden centers either; because of perishability of the product. An illustrative example will be provided; if a grower doesn't sell some variety of flowering plant by the end of the season, he/she won't be able to sell it next season because the product is perishable. Assume the cost to the grower was $ 1.00 per plant to grow them to the point of sale. When the plant is produced, a grower would rather sell it at $ 0.10 per plant, than to recoup nothing on that particular product. Although the

example is an extreme one, it describes a real-life problem. If buyers are willing to speculate on some of these matters, they might be able to do so in realistic terms. For that reason, it is very difficult for growers to bargain on equal terms with any market channel. The bottom line is that mass-merchandisers are hypothesized to have more market power than garden centers and of course, more market power than growers. Conversely, market power imbalance is expected to be less asymmetric, for the most part, in the grower-garden center relationship. Under such a scenario, and evaluating the global outcome of all the individual McNemar's tests, the number of items exhibiting significant differences should be greater for mass-merchandisers than for garden centers. However, an overall measure of change is going to be presented in the second part of the first objective.

Other channels available to growers are (i) re-wholesalers, (ii) landscape services, and (iii) other retailers. Re-wholesalers were not included in this analysis due to their lack of homogeneity in terms of activities and objectives. Their specific role in the industry generally is that of a "middleman" between nurseries and buyers. Research done in the past suggests that the difficulty categorizing re-wholesalers stems from the fact that they can also be growers (Brooker, et al.). Growers that purchase materials from other nurseries for resale are considered re-wholesalers, for instance. Other players in the re-wholesale category are businesses that locate themselves near retail markets, where they can serve their retail customers as well as small landscape firms that don't want to order large quantities. In addition, re-wholesalers can serve large landscapers when they need large quantities of material in a short time-span. At the same time, re-wholesalers can serve garden centers with the same kind of services they offer to the other marketing channels. Generally, this diversity in re-wholesaler activities and objectives

makes development of expected relationships more difficult compared to the mass-merchandisers and independent garden center channels.

The landscape services channel, particularly intermediate and large firms, tends to form long-term business arrangements with the nursery firms that supply the material they need. This marketing channel has specific characteristics, and there is a clear difference in the way business is done compared to the other marketing channels. First, the landscaping sector sells services in addition to plants. For example, when a new house is built, a landscaper may be contracted to do the design and the planting of the terrain from start to finish. The contractor is responsible if the customer is not satisfied after the work has been completed. Second, landscapers do not move large quantities of products, as would a mass-merchandiser or a garden center. Landscapers often use higher quality plant material to complement the service they provide. They tend to establish long-term relationships without the existence of a formal agreement. Finally, this segment is unique in that customers are not very sensitive to price of plants because they pay for an entire job.

3.3. Items in the Sales Agreement

3.3.1. Minimum Volume and Continuous Inventory Replenishment

One of the important aspects in the exchange of products between nurseries and buyers revolves around the selection of the type of inventory replenishment adopted. Two main choices of inventory replenishment can be observed in the industry, minimum volume and continuous replenishment. First, the parties may agree to a minimum volume delivery, where the seller agrees to sell at least a given amount of the product. Another alternative is for growers to engage in inventory replenishment with a given retailer. Inventory replenishment arrangements would mean that the grower must continually provide the retailer with products on an “as needed” basis.

In order to provide continuous inventory replenishment, the grower would need at least a computer, an Internet connection, and a software package that would enable them to monitor inventory levels, sales and profit data real-time. In general, the buyer would provide the software package and the training for its use.

Mass merchandisers are more likely to engage in continuous inventory replenishment than garden centers, mainly because they have the capability to conduct business in that way, and it reduces inventory costs. For this reason, as more growers do business with mass-merchandisers, it is expected that significant changes would have occurred from 1996 to the year 2001 for this marketing channel. Also, a decline was expected for the mass-merchandiser channel under the minimum volume arrangement. On the other hand, independent garden centers are not expected to have continuous inventory replenishment arrangements at all; hence, no significant changes are expected. Garden centers are hypothesized to operate under minimum volume arrangements, and significant changes are expected from 1996 to 2001, meaning that more growers are expected to report minimum volume arrangements in 2001.

3.3.2. Transportation to Retailer

Respondents were asked if the terms of their contract with buyers included provisions for arranging the transportation of the products from the point of origin to the point of sale. Due to the degree of missing data it is difficult to use the data to determine who bears the cost of transportation. However, it makes sense to assume that, even if the buyer pays for the transportation, which is the most common arrangement, the grower needs to organize and conduct the logistics of the transportation, thus incurring an extra cost. This extra cost may not be readily measured in terms of dollar figures, but can be measured in terms of time and resources that would otherwise be dedicated to the production process.

Mass-merchandisers and garden centers are expected to exhibit significant differences since 1996, but mass-merchandisers are expected to have a higher count of growers engaging in these arrangements than garden centers. Again, the ability, or lack thereof, to transfer the transportation arrangements to the grower is hypothesized to correlate highly with the market power of the buyer. In other words, the grower has to provide for these services in order to conduct business with mass-merchandisers and garden centers.

3.3.3. Returnable Shipping Equipment

The use of returnable shipping equipment has benefits in terms of facilitating display as well as the handling of products. Returnable shipping equipment can be thought of metal or heavy plastic racks with wheels. Plants in containers are placed on these devices for transportation, movement at the retail site, and sometimes for display. If a grower is responsible for having returnable shipping equipment to haul products to the point of sale he/she will have to incur the cost of purchasing such equipment. Returnable shipping equipment facilitates the physical process of loading/unloading as well as handling the products. If the buyer requires a nursery firm to provide returnable containers, not only is he reducing costs associated with the handling of the products at the retail facility, but is also imposing additional costs for the nursery firm (the cost of getting the equipment). It follows that a buyer can only impose such conditions if he/she has comparatively more market power than the seller. In addition, it would be reasonable to expect that retail operations with a high degree of complexity and product assortment, like mass-merchandisers, might need this type of business arrangement more than a smaller retail operation, such as garden centers, in order to decrease the resources allocated to the arrangement of these products on the retail floor. Mass-merchandisers are expected to exhibit

significant change from 1996 to 2001 in requesting these services, while garden centers are not expected to include this item in the terms of contract with growers.

3.3.4. Custom Containers

Retailers may request the seller to package products following specific guidelines for their own convenience. From the marketing standpoint there are three basic functions the package must provide: to contain and protect the product, to promote the product, and to facilitate the storage of products. An additional function of packaging that is becoming increasingly important is to facilitate recycling and reduce environmental damage (Marketing, 2000). In the nursery industry, retailers may want the seller to have a certain color or container quality. This aspect of the product is important to the retailer because it allows for differentiation across marketing channels and branding. Mass merchandisers are expected to request more packaging conditions in a contract than would independent garden centers, since it's hypothesized that mass merchandisers have relatively more market power, enabling them to bargain for this type of service. Another reason that would make mass-merchandisers more likely to request custom containers is that they decorate their retail facilities according to the season of the year. For example, as the Christmas holidays near, mass-merchandisers decorate their retail facilities with a Christmas theme, where the predominant colors are green and red. The mass-merchandiser may request the grower to provide red and green containers to go with the interior decoration. Along with the choice of color, there are other dimensions that the buyer might specify, such as shape and size of these containers. On the other hand, garden centers not only lack the bargaining power to be able to request these types of arrangements, but also, they are usually less involved in "theme" decorations to their retail facilities. On the other hand, although garden centers also do the same type of decorations, they lack the market power to require

custom containers from growers. From the grower perspective, packaging the products in a certain way is a service they provide to the mass merchandiser to be able to conduct business with them. Significant changes are expected for the mass-merchandisers channel from 1996 to the present, while no change is expected to occur for the garden center market channel. Overall, more growers are expected to provide mass-merchandisers with custom container specifications versus garden centers.

3.3.5. Product Information Tags

Many nursery firms are known to perform tagging on the products they sell. It is convenient that the nurseries add the tags because generally, barcodes will be added to these tags, making the product ready to be scanned at the point of sale. In addition to providing a space for the barcode sticker, some general information on the product can be conveyed in the remaining space. In general, nursery firms tag and absorb the cost of tagging. Some independent garden centers may not need tags and/or barcodes for scanning the product at checkout, since they don't have the technology available at their stores. On the other hand, all mass merchandisers are hypothesized to need tags on their products. Mass merchandisers are more likely to request tagging provisions in a contract than are independent garden centers. Significant differences are expected for mass-merchandisers and no significant differences are expected for garden centers.

3.3.6. Barcode Sticker

The need for barcode stickers for nursery products is expected to be high for retail outlets with scanning technology. In general, that is the standard business practice for mass-merchandisers. On the other hand, it is hypothesized that not all independently owned garden centers are up to date with the technological advances and equipment, such as having a barcode

scanner at the registers. The need for barcode scanning technology is tied to continuous inventory replenishment in that the seller has an integrated supply chain where it can monitor, real-time, what it is selling and what products are needed. This is needed in large retail facilities to ensure efficiency and a greater degree of control. Garden centers, on the other hand, might not have the size necessary to justify the investment in this type of technology. Significant change is expected for this item for mass-merchandisers, and no change is expected for this item in the garden centers market channel.

3.3.7. On-time Delivery

The implementation of supply chain management in the mass-merchandiser segment has changed the way in which business is conducted. One such change is the reduction of the time between when the order placement occurs and when the order arrives, generally referred to as "lead time." McLaughlin, Perosio, and Park (1997) reported that retailers were working on reducing lead times from 8.3 days in 1996, to 3.8 days in the year 2000 for products in the health and beauty category. Because nursery products cannot be stored for long periods of time in inventory, and because the products in general become less valuable the longer they are held in inventory, the distribution system operates in a "just-in-time" approach. However, as mass-merchandisers engage in supply chain management, the flow of information from retailers to growers is enhanced. This enhanced flow of information, for instance, may allow retailers to make more last-minute adjustments to the orders that are in place. According to FreshTrack 2001, in today's produce industry retailers make more last-minute adjustments to those orders, such as cancellation of loads, reduction of loads, or additional loads. The growers in the produce industry, in an effort to cope with these adjustments, indicated that they now carry extra inventory in case orders increase at the last minute (FreshTrack, 2001). If a retailer reduces an

order from the original amount, the grower has to ship only the amount of product indicated. If the scenario faced by produce suppliers is similar to that of nursery growers, a situation like this would leave the producer with unsold plants for which he/she has to find alternative buyers, thus increasing costs. If the case happens to be that the retailer increases an order size, the producer has to respond by adding additional products to the shipment, and at the same time, getting the shipment on time to the retailer. In a case like this, the producer's extra inventory comes into play. Again, the reduction in inventory at the retail level often has caused increases in inventory levels at the producer level.

The above example shows that the ability of a producer to honor orders in a timely manner comes at a cost associated with adjustments in inventory levels to cope with sudden changes in the orders from the retailers. If growers are conditioned to a very strict timing of an order, he/she may have to incur additional costs to make sure that orders are delivered in a timely fashion, and at the same time, comply with other requirements such as increased order amounts, decreased order amounts, or canceled orders.

Another reason why buyers of nursery products would want to include on-time delivery specifications is that they might need to have a strict time schedule for orders at the receiving dock. Especially, mass-merchandisers might receive many types of different products and only have a limited amount of space to unload trucks. Because nursery products are perishable, on-time delivery would allow the timely unloading of the products. On the other hand, any idle time caused by an untimely arrival might not only result in loss of products, but also in delays in arriving at other retail facilities at the scheduled dock time.

The mass-merchandiser segment is expected to have experienced significant change from 1996 to 2001 because delivery of products in a timely fashion allows for scheduled dock time to be used efficiently. More growers are expected to comply with this condition in 2001.

Significant changes are expected to occur for the garden center market channel in the period between 1996 and 2001. This marketing channel doesn't carry as many products as mass-merchandisers, which allows the owner/manager to be more aware of the needs in terms of inventory.

3.3.8. Take Back Unsold Merchandise

Little information was found in the literature regarding inclusion of a provision in a contract stipulating whether the buyer or the seller is responsible for unsold merchandise. In the past, retailers assumed the cost of unsold merchandise, but there likely were exceptions. This item was included in the research instrument mainly as an exploratory item, and to shed light on take-back policies within the industry. Independent garden centers are not expected to have such provisions in contracts. Mass merchandisers are more likely to include such provisions based on the assumption that they have more market power than alternative market channels.

In traditional marketing systems, the buyer would take ownership of products at the farm level and would be responsible for what happens to the product from the moment they take ownership. The inclusion of a take-back policy would mean that practices are shifting. The norm is that retailers are responsible for unsold merchandise. Deviations from this norm have two possible implications. First, growers and retailers may choose to share the cost of unsold merchandise, or growers may be held responsible for unsold items. The inclusion of a take-back provision for unsold merchandise is more likely to be found in mass -merchandiser-grower contracts, and less likely to be found at independent garden center-grower contracts.

3.4. Procedures

3.4.1. Objective One

To evaluate changes in the terms of the contract between nursery growers and buyers of their products across selected marketing channels.

3.4.1.1. Part II

Devise an aggregate measure of change within the time frame of the study to evaluate if, considering all the items together, changes in the terms of contracts have occurred.

3.5. Expectations

3.5.1. Mass-Merchandisers

The null hypothesis states that there is no overall change in the terms of contract, while the alternative hypothesis would indicate that overall changes in the terms of contract have occurred between 1996 and 2001.

3.5.2. Garden Centers

The null hypothesis states that there is no overall change in the terms of contract, while the alternative hypothesis would indicate that overall changes in the terms of contract have occurred between 1996 and 2001.

3.5.3. Discussion

To test the hypothesis that overall, more items are included in the terms of contract in the year 2001 in comparison with the year 1996 for mass-merchandisers and garden centers, a McNemar's test will be employed. However, instead of evaluating changes in each of the items included in the terms of contract, all of the nine items included in the questionnaire will be considered at the same time. Two tests will be conducted, one for mass-merchandisers and one for garden centers.

The data was organized in a 2 x 2 table for each of the two marketing channels. The rows are the response categories for the year 1996, and the columns are the response for the year 2001. The two "main diagonals" indicate the total number of items not included in the terms of contract either in 1996 nor 2001, and the total number of items included in the terms of contract for both years, respectively. The first "off-main diagonal" from left to right gives the cases where any given item was in the terms of contract in 1996 but was not in the terms of contract in 2001. Conversely, the second "off-main diagonal" indicates the total number of people that indicated that any given item was not included in the terms of contract in 1996 but was included in the year 2001.

In measuring overall change in the terms of contract for both channels, significant differences are expected for both marketing channels. However, significance in the overall context is closely tied with the analysis in the first part of objective one. For instance, if there is no difference in each of the nine items included in the terms of contract between growers and garden centers, there won't be a significant difference in the more global change measurement applied here. Conversely, if all items are found to exhibit significant differences, significant differences are likely to be indicated in this segment of the analysis. This overall measure of change is important to identify if changes are only occurring in specific items in the terms of contract, or if it's a more widespread phenomenon affecting all aspects of the negotiation process.

3.6. Objective Two

To analyze whether the business and general characteristics of Louisiana nursery firms have an effect on the inclusion of the different items in the terms of a contract. The inclusion of each item in the terms of a contract will be explained using the individual contract terms.

3.6.1. Discussion

Initially, the approach was to use a multinomial logistic regression for each of the items in the terms of contract as included in the questionnaire. The presence of an individual item in the terms of contract is a function of business structure and general characteristics of Louisiana nurseries. Table 3.01 shows the preliminary independent variables, with a brief explanation, that will be included in the model.

Table 3.01 - Explanatory Variables and Their Description

Variables	Variable type	Description
Size	Continuous	Amount of land dedicated to the production process
Age	Continuous	Years since the firm was created
Legal organization	Dummy	Legal structure of the firm
Sales	Continuous	Gross sales in 2001, in $10,000
Negotiated	Continuous	Concessions as a percentage of total sales
Employees	Continuous	Number of full-time employees
Big Four Buyers	Continuous	Percentage of total sales going to the four biggest buyers
Buyers	Continuous	Total number of buyers
Exit Barriers	Continuous	Investment that can only be used for nursery production
Debt	Dummy	Represents the presence or absence of debt
Internet	Dummy	The use of internet as management/technology descriptor
Sales involvement	Continuous	Proportion of sales dealt outside the firm's facilities
Year	Dummy	Variable to control for time

Source: Ornamental Horticulture Producer Survey.

The dependent variable in each of these models will have a value of one, zero or minus one. A minus one would indicate that a given item was present in the terms of contract in 1996 but was excluded from the terms of contract in 2001. A result of zero means that there were no changes in the individual terms of contract. However, note that the case may be that the items were not included either in 1996 or 2001, or it may be the case where the item was included in both 1996 and 2001. Finally, a result of one indicates the inclusion in 2001 of an item in the terms of contract that was not included in the year 1996. These change measures were constructed for each of the dependent variables and their frequencies can be observed in Table

3.02. In the mass-merchandiser market channel, there are two cases where the exclusion of a given item from the terms of contract shows zero frequencies; for returnable shipping equipment and for on-time delivery. No frequencies higher than 2 were seen in the exclusion column. However, examining the inclusion column shows that only two items exhibit low frequencies; on-time delivery and minimum volume, with a frequency of one each.

Table 3.02 - Dependent Variables and Their Frequencies Depicting Changes in the Terms of Contract from 1996 to 2001

	Mass-Merchandisers			**Garden Centers**		
Variables	Excluded	No Change	Included	Excluded	No Change	Included
Product Information Tags	2	31	5	1	28	9
Barcode Sticker	1	27	10	0	33	5
Custom Containers	2	25	11	1	37	0
Transportation to Retailer	1	33	4	1	34	3
Returnable Shipping Equipment	0	33	5	1	36	1
On-time Delivery	0	37	1	1	33	4
Take Back Unsold Merchandise	2	28	8	0	38	0
Minimum Volume	1	36	1	0	34	4
Continuous-Inventory-Replenishment	2	29	7	0	34	4

Source: Ornamental Horticulture Producer Survey.

When examining the responses and frequencies for each of the three categories denoting change in the garden center marketing channel, four variables have a zero frequency in the exclusion column; barcode sticker, take back unsold merchandise, minimum volume, and continuous inventory replenishment. The remaining five items in the exclusion column have a frequency of one. On the other hand, the inclusion column for garden centers has only three items with frequencies of one or less, and these are; custom containers, returnable shipping equipment, and take back unsold merchandise. Table 3.02 shows that even though a multinomial logit approach would still be appropriate to analyze some of these items in the terms of contract, a richer analysis was provided by using an alternative presentation of the model. Given that the vast majority of the observations are classified in the “no change” category, and because the

presence or absence of a given item in the terms of contract in both periods (years 1996 and 2001) cannot be differentiated, an alternative approach is going to be used.

In order to avoid having very few or no observations per cell, a logit model will be constructed to test whether the presence (or absence) of a given item in the terms of a contract can be explained by different firm characteristics. However, in order to take into consideration the effect of time on the probability that a given item is in the terms of contract or not, a control dummy variable is going to be included in the model representing years 1996 or 2001. Also, by measuring the presence (or absence) of a given item in the terms of contract, both in 1996 and 2001, it is possible to identify those growers that exhibited no change due to a lack or presence of any given item in the two periods comprising this study. According to Gordon Johnson, from the SAS Institute Inc., generalized estimating equations (GEEs) provide a practical method with reasonable statistical efficiency to analyze the data collected and the proposed models. GEEs were introduced by Liang and Zeger (1986) as a method for dealing with correlated data when, except for the correlation among responses, the data can be modeled as a generalized linear model. Correlated data can arise from situations, such as longitudinal studies, in which multiple measurements are taken on the same subject at different points in time, or in clustering, where measurements are taken on subjects that share a common category or characteristic that leads to correlation. The correlation must be accounted for by the analysis methods appropriate to the data. Possible consequences for analyzing correlated data as if it were independent are; incorrect inferences concerning regression parameters due to underestimated standard errors, or inefficient estimators (Johnston, SAS Institute Inc.). In order to conduct this analysis using the SAS software package, the generalized linear model is chosen, adding the "Repeated by VendorID" command. This allows the software to recognize the correlation in the data as a consequence of

the longitudinal nature of the dataset. VendorID is not a variable that is part of the model, but serves the purpose of identifying the observations corresponding to the same grower.

The presence of an individual item in the terms of contract is a function of business and general characteristics of Louisiana nurseries, as well as the control variable year. In this study, there are two observations per individual, one observation for the year 1996 and another observation for the year 2001. Basically, the only changes in these observations are going to be the values taken by the dependent variable, and the corresponding value of the control variable "year." The drawback to this approach is that, in order to make valid predictions, historical information on the presence/absence of any given item in the terms of contract is needed. Nevertheless, the research being conducted is exploratory in nature, since very little or no similar work was found in literature, and the efforts are concentrated on discovering relationships among the variables rather than concentrating on predicting an outcome. In other words, before a successful predictive model can be devised, it is imperative that the forces shaping the industry be understood.

Generally, the standard practice in the industry is to fix a price at the moment a contract is made. This results from the fact that no market exists for price discovery and price comparison. Given that there is no alternative pricing strategy, there is no need to ask producers what is the mechanism to establish a price at the time of contracting.

3.7. Independent Variables

3.7.1. Size

This variable measures the relative size of a firm by the amount of space dedicated to production. The higher the amount of land dedicated to production, the more likely that grower will accept a given term in order to obtain the contract, for several reasons. First, the more land

dedicated to nursery production, the greater the marketing risk associated with the activity, hence, accepting the terms of contract by the buyer reduces this type of risk. Second, larger investments in facilities heighten the need for demand assurance. The reason is that uncertainty about the buyers can induce sellers to seek out different forms of integration to assure buyers for the firm's output. Third, the larger the facilities dedicated to production, the greater the need for capital to run the production operation. In the statistical analysis and the different models, this variable will be named 'fieldpro'. According to Knight et al., forward pricing or contract production may improve access to capital by assuring lenders that the producer will be receiving a specific price, as well as assuring the lender that there is a buyer.

3.7.2. Age

This variable is a discrete continuous variable. It was computed by subtracting the year in which the firm was created from 2001, resulting in the age of the business. The relationship between the age of a business and the probability of including items in the terms of contract was not determined.

3.7.3. Legal Organization

The legal organizational structures nursery firms can take are three: sole proprietorship, partnership, or corporation. However, both partnerships and proprietorships are grouped in the same category, in contrast to corporations. Proprietorships and partnerships are similar in that, generally, in both cases the owner or partners are personally liable for any difficulties and debts related to the business. Furthermore, these two types of legal organization are similar in that they offer poor business continuity. For instance, the death of one partner or sole proprietor, or disagreement between partners, might cause the disruption of business and the termination of the company. On the other hand, the corporate structure offers a protective umbrella on the personal

assets of shareholders, and also guarantees the continuity of a business, since shares of stock can be purchased and sold without actually transferring title to specific company resources, even if corporations are not publicly traded companies (Kay and Edwards., 1994). Corporations are then expected to exhibit a higher probability of having any given item present in the terms of a contract relative to the proprietorship-partnership category. This is based on the notion that in today's business world, stakeholders are realizing the benefits of long-term partnerships, rather than a one-time deal. Keeping in mind that business continuity is an important factor in the life-cycle of a business, it is expected that firms that offer greater continuity opportunities are going to be the ones engaged in longer-term business deals, such as contracting.

3.7.4. Sales

The variable "sales" measures the amount of sales of a firm to the nearest $5,000 in the year 2001. However, for the pursposes of the statistical analysis, the variable 'sales' was used in units of $10,000. This variable might be correlated with the size of the firm in acres, to the number of full-time workers a firm has, and to the exit barrier variable. It makes sense that the more area dedicated to production, the more sales are going to be generated. By the same token, the more employees a firm has, the more production can be expected. The same rationale applies to exit barriers. The higher the specific level of investment for nursery production, the greater the production capabilities, which should be reflected in total sales. These variables, amongst others, are going to be examined closely to detect multicollinearity.

Marketing risk increases proportionally to the amount of sales of a nursery firm. The reason to consider sales as a proxy for marketing risk instead of as a market power measure is that no nursery grower has enough sales to be able to negotiate on equal terms with mass-merchandisers. Mass-merchandisers carry a vast assortment of products, and ornamental plants

represent a very small fraction of the total sales for this market channel. In general, prices are not expected to be very different for big and small producers. Consequently, higher sales are positively related to the amount of product a nursery sells, and it follows that a firm producing large quantities of plants faces more risk than a nursery producing less output. For example, suppose a buyer has agreed to purchase a certain product from a nursery grower at a certain price, and under specifications agreed by both parties. However, another grower having the same type of product hasn't been able to sell his products, so he/she faces the decision of "dumping" the product or to offer the product at a lower price than current buyers are paying. If the second grower "dumps" the products, he/she will have incurred the costs of growing the product, but will receive less than the market price, since he/she is disposing of the stock. On the other hand, if the second grower offers the buyer of the first grower the same type of product at half the price offered by the first grower, it is likely that the buyer will cancel the order to the first grower and will source for products from the second grower at a lower price. These type of situations are more likely to occur in the case of seasonal plants, which have no alternative use when the season is over. The example was a little dramatic, but it's a situation that growers experience. To offset this marketing risk and to address the need of demand assurance, larger firms are more likely to accept the terms of contract than smaller firms. In addition, firms having more sales, as opposed to less sales, might also have greater cash flow needs to support production, which signifies an additional reason for contracting. Lenders are also more likely to lend funds to a firm that contracts, because such firm has an "assured" buyer.

For small firms, the transaction cost of contracting may outweigh its advantages. For instance, for a small producer, it might be cheaper to sell products to occasional buyers rather than contract with a specific buyer. On the other hand, bigger firms can assimilate the cost of

vertical coordination and at the same time reduce transaction costs. Contracting allows bigger firms to internalize performance controls and to implement conflict resolution provisions (Clarkson and Miller, 1982). In conclusion, bigger producer firms are more likely to accept any of the given terms of contract than smaller firms. In other words, as sales increase, so does the probability of having an item in the terms of contract, especially for the mass-merchandiser marketing channel.

On the other hand, the variable 'sales' is going to be a proxy for market power in the garden center models. In many cases, garden centers are relatively small, family owned stores, so growers and these types of buyers are able to negotiate on a similar level in terms of market power. If this hypothesis is true for the garden center marketing channel, a negative relationship should be detected between the inclusion of an item in the terms of contract and sales.

3.7.5. Concessions

This variable is a proxy for the lack of market power of producers relative to buyers. For instance, if a grower reports that he/she made concessions on a large percentage of total sales, it can be assumed that he/she is at a disadvantage in terms of negotiating power, or market power, relative to the buyer; hence, the concessions are made in order to assure the sale. Considering that there is a large number of producers, as well as low producer concentration, it is very difficult for any given nursery firm to have more market power than the buyers. On the other hand, recent retail consolidations, and changing business practices such as supply chain management, result in increased buyer concentration, which has enhanced market power for buyers relative to producers. The construction of this variable relies on the responses of producers, who were asked to determine the percentage of total sales on which they have to

make concessions in order to achieve the sale. It is hypothesized that as the percentage of concessions increases, the more likely the firms are to accept any of the given terms of contract.

3.7.6. Employees

This variable seeks to account for labor used in the administrative as well as operative aspects of the business. For the sake of simplicity, labor is reported as the number of people working full time. Adjustments are necessary to find the full-time equivalent of all seasonal and part-time workers. This specific variable might be positively correlated to size, as mentioned earlier. Hence, the expectations and reasoning are the same as with the variable size. It follows that, as the number of employees increases, so do the firm's production capabilities. With higher production capabilities comes a higher marketing risk, and a higher need for demand assurance, hence, the firm might be willing to accept conditions imposed by buyers in order to offset the marketing risk and gain demand assurance. As the number of employees increases, so does the probability that a given item is included in the terms of contract.

3.7.8. Big Four Buyers

This variable measures the percentage of sales going to the biggest four buyers. It can be thought of as a measure of oligopsony power to some extent, or how dependent the seller is on the buyer. For example, 90% of sales going to the biggest four buyers might indicate a higher oligopsony power than only 20% of sales going to the biggest four buyers. Consequently, the higher the buyer concentration of a specific firm, the more dependent the firm is on those buyers. Nursery firms facing a high percentage of sales going to the biggest four buyers are expected to be more likely to accept any of the given terms of contract than firms with a large customer base, as a consequence of the imbalance of market power favoring the buyer. However, due to the exploratory nature of this research, an alternative hypothesis would be that firms with a low

percentage of sales going to the biggest four buyers might have a much more diversified customer base, enabling them to try new ventures or new business practices with a lower risk exposure level. Under the alternative, firms with low percentage of sales going to the biggest four buyers are more likely to accept any of the given items in the terms of a contract.

3.7.9. Buyers

Respondents were asked to provide the total number of customers they have. If a given nursery firm has a broad customer base, then he/she is expected to be less likely to agree to any of the terms of contract, while the opposite is also hypothesized to be true. A large customer base somewhat reduces marketing risk because it offers the seller more options in placing his/her products. In addition, the diversification in terms of the number of buyers implies that the seller might be less dependent on one single buyer, as opposed to a nursery firm with relatively few buyers. Altogether, having a large customer base diminishes the need for demand assurance associated with losing one specific customer. In addition, autonomy is increased in a firm that is more flexible in production and operating aspects of the business as opposed to being tied to the production of certain products requested by important customers.

In the survey sent to producers, respondents are asked to indicate the relative percentages of total sales that are retail and wholesale sales. In another question, they are asked to indicate the number of buyers they have. If a nursery has some retail sales at their location, it is impossible to find out how many of the total number of buyers are wholesale and how many are retail. In order to include this variable in the analysis, only the firms having no retail sales could be included, because only in that way would it be possible to know how many wholesale clients they have. Excluding the firms that have some degree of retail sales would reduce the dataset drastically.

3.7.10. Exit Barriers

This variable is included to reflect exit barriers specific to each firm in the industry. For this purpose, producers were asked to estimate the values of their assets under two scenarios. First, producers are asked what would the business sell for to someone planning to continue with nursery production, and second, producers are asked what would the business sell for to someone not planning to engage in nursery production. The difference between these two values was hypothesized to be a proxy for the firm's asset specific investment in the ornamental horticulture industry. If this difference is the level of asset specific investment of the firm, it can be thought of as a barrier to exit.

The higher the exit barriers, the more likely firms are to accept any of the items in the terms of contract. Specifically, accepting the different terms of contract by the buyer means that producers are able to reduce their risk exposure by committing to contract. On the other hand, the lower the barriers of exit are, the less likely firms are to accept the items in the terms of contract.

3.7.11. Debt

Producers were asked to estimate their debt/asset ratio. All growers that reported nonzero values for the debt/asset ratio are grouped in a single category as having some degree of debt. The remainder of the firms, which are companies with no debt, are pooled into another category. The reason to pool the data into only two categories, instead of having a continuous variable, is that the variable is severely skewed. Fourteen of the 38 growers reported zero values, and the mean is 17.42. Creating this variable resulted in 14 growers having no debt and 24 growers having some degree of debt.

The expectation for this variable was not determined. On one hand, if a firm has a debt, the higher the financial risk to the firm or business relative to a scenario in which the firm had no

debt. Accordingly, the producer may feel a higher need for demand assurance and need for careful planning. In short, a grower may be more likely to accept the items included in the terms of contract if the company has a non-zero debt/asset ratio. On the other hand, producers with no debts may feel less need to further reduce risk; hence, they are less likely to accept any of the items in the terms of contract. However, an alternative reasoning would be that, when a grower complies with the buyer's requests means that he incurs higher costs, and consequently, faces higher risks. In order for a firm to accept the items imposed by the buyer, it must have some secure financial position. By this logic, firms with no debt are more likely to accept any of the given items in the terms of a contract.

3.7.12. Internet

Producers were asked to respond if they used the Internet for marketing and communication purposes, or if they didn't use the Internet at all. Contracting requires that products be treated according to specifications requested by the buyers; in other words, the final product is customized to fit the needs of the client. In cases where nurseries serve more than one customer, traceability of the different orders/contracts may prove to be difficult without some means of computerization to aid in the organization of the production and marketing processes. It wouldn't be unreasonable to assume that some degree of computerization is needed for a firm to engage in business-to-business selling, webpage promotion and other uses of the Internet. This variable is included in the models to represent the adoption of technology in the form of computerization of the production/marketing process. This variable is expected to be positively related to the presence of an item in the terms of contract.

3.7.13. Sales Involvement

Producers were asked to state the proportion of total sales that they carry out in each of the following ways; trade shows, salespeople by geographic territories, salespeople in the main office, business-to-business, mail orders, and drop-in customers. The first two means of sales, trade shows and salespeople by geographic territories, are considered to be high involvement sales efforts because they require that a person/team leave the nursery facility with the sole purpose of making sales, finding sales leads, and making contacts. On the other hand, the other means of sales are not considered high involvement, because employees can be doing other administrative activities at the nursery, and only dedicate time to conducting a sale when a customer arrives, or when a telephone or e-mail is received. For mail orders, no additional sales effort is required from the employees, only that they comply with the order. The cost of participating in trade shows, and the cost of maintaining salespeople in the field can be thought of as transaction costs for the nurseries. The need to engage in high involvement sales will depend on the firms' characteristics, but no interaction effects will be taken into account in this analysis. According to Hudson (2001), transaction costs are important in contract participation, and as transaction costs increase, contracting increases. In essence, as high involvement sales increase, the probability that a given item is included in the terms of contract increases for both market channels.

3.7.14. Year

This variable is included in the models to control for the effect of time on the terms of contracting between growers and buyers. If it's true that mass-merchandisers and garden centers are gaining market power relative to growers as retail consolidation occurs, it is expected that

time has a positive effect on the probability that any given item is included in the terms of contract between growers and buyers.

3.8. Variables Included in the Model

Because the sample size to be used in the analysis is relatively small, not all the variables were included in the logistic regression models. For instance, there are four observations for which there is no response to question 16 in the survey instrument, which measures the percentage of total sales for which the grower had to make concessions to the buyer. It is not known if the individuals didn't want to respond, or if they didn't understand the question, and thus failed to respond. Including the 'concessions' variable in the analysis would mean that four observations would have to be taken out of the sample, because there is no reasonable way to remedy for this type of missing data without biasing the sample.

In addition, the variable 'age' was not included in the analysis because no clear expectations were made on its significance and on the nature of the relationship between age and corresponding dependent variables.

In order to detect collinearity problems, a linear regression was run using the SPSS software package. This statistical package provides an option that gives collinearity diagnostics, such as the variance inflation factor and tolerance values. For the purposes of the study, tolerance values of less than 0.650 would indicate the presence of collinearity. Tolerance was the statistic used to determine how much the independent variables are linearly related to one another. The reported number was the proportion of a variable's variance not accounted for by other independent variables in the equation. A variable with very low tolerance contributes little information to a model, and can cause computational problems. It was calculated as 1 minus R squared for an independent variable when it was predicted by the other independent variables

already included in the analysis. Conversely, the variance inflation factor (VIF) is the reciprocal of the tolerance. As the variance inflation factor increased, so does the variance of the regression coefficient, making it an unstable estimate. Large VIF values are an indicator of collinearity. In the case that several variables exhibit low tolerance values, one variable at a time was removed from the model, and another linear regression was run to detect if there was still some collinearity present in the remaining variables. This was done until there were no more variables left with tolerance values lower than the goal of 0.650. The dependent variable, in this case, was product information tags for mass-merchandisers, and the explanatory variables were 'size', 'legal organization', 'sales', 'employees', 'big four buyers', 'exit barriers', 'buyers', 'debt', 'internet', and 'outsales'. Table 3.03 shows the tolerance and variance inflation factor (VIF) values for the first regression. Clearly, 'exit-barriers' presented collinearity problems and was not included in the models.

Table 3.03 - Collinearity Statistics for Full Model #1

Variables	Tolerance	VIF
Big Four Buyers	0.308	3.246
Legal Organization	0.5	2
Internet	0.525	1.905
Outsales	0.623	1.604
Debt	0.529	1.892
Sales	0.104	9.611
Fieldpro	0.087	11.472
Employees	0.027	37.336
Buyers	0.143	6.982
Exit-barriers	0.015	66.376

Source: Ornamental Horticulture Producer Survey.

The results of the collinearity diagnostics can be seen in Table 3.04. The variable 'sales' had the lowest tolerance value, but it was not removed because it plays an important role in the explanatory theory for this analysis. Instead, the variable 'fieldpro' was removed, with a tolerance of 0.169.

Table 3.04 - Collinearity Statistics for Full Model # 2

Variables	Tolerance	VIF
Big Four Buyers	0.375	2.669
Legal Organization	0.766	1.306
Internet	0.526	1.899
Outsales	0.777	1.288
Debt	0.799	1.252
Sales	0.15	6.652
Fieldpro	0.169	5.915
Employees	0.295	3.392
Buyers	0.213	4.688

Source: Ornamental Horticulture Producer Survey.

The results of the collinearity diagnostics can be seen in Table 3.05. There were several variables with unacceptable tolerance values; big four buyers, Internet, sales, employees, and buyers. The variable 'buyers' was removed from the models, and another regression was run to determine if collinearity problems persist.

Table 3.05 - Collinearity Statistics for Full Model # 3

Variables	Tolerance	VIF
Big Four Buyers	0.378	2.647
Legal Organization	0.79	1.266
Internet	0.527	1.897
Outsales	0.777	1.287
Debt	0.808	1.237
Sales	0.214	4.67
Employees	0.401	2.492
Buyers	0.214	4.678

Source: Ornamental Horticulture Producer Survey.

The results of the collinearity diagnostics can be seen in Table 3.06. There were two variables with unacceptable tolerance values, and they were sales and employees. The variable 'employees' was removed and another linear regression was run to verify if there were collinearity problems among the explanatory variables.

As can be seen in Table 3.07, all tolerance values met the selection criteria specified before. In addition to the variables in the table below, the model will also include the control variable 'year', and the intercept. In conclusion, each of the items in the terms of contract was

hypothesized to be a function of 'intercept', 'big four buyers', 'legal organization', 'Internet', 'outsales', 'debt', 'sales', and 'year'.

Table 3.06 - Collinearity Statistics for Full Model # 4

Variables	Tolerance	VIF
Big Four Buyers	0.669	1.494
Legal Organization	0.745	1.343
Internet	0.844	1.185
Outsales	0.751	1.332
Debt	0.784	1.276
Sales	0.412	2.429
Employees	0.419	2.389

Source: Ornamental Horticulture Producer Survey.

Table 3.07 - Collinearity Statistics for Full Model # 5

Variables	Tolerance	VIF
Big Four Buyers	0.743	1.345
Legal Organization	0.728	1.373
Internet	0.844	1.185
Outsales	0.781	1.28
Debt	0.788	1.269
Sales	0.698	1.433

Source: Ornamental Horticulture Producer Survey.

Table 3.08 - Expected Signs on the Explanatory Variables in the Models by Market Channel

Variable	Mass-Merchandiser	Garden Centers
Legal Organization (Non-corporations)	?	?
Sales	+	-
Big Four Buyers	+	+
Debt (No debt)	?	?
Internet (No internet)	-	-
Sales Involvement	+	+
Year (1996)	-	-

Source: Ornamental Horticulture Producer Survey.

Table 3.08 presents a summary of the expectations of the independent variables included in the model. For dummy variable categories, the expectation was done for the category included in the model, rather than the reference category. For instance, firms that are corporations are expected to be more likely to include an item in the terms of contract than alternative forms of business organizations. However, since the category included in the models corresponds to non-

corporations, the sign in the table was negative. The category included in the models reflects that firms have no debt, no Internet and the year 1996, respectively.

3.9. Problems in Logistic Regression Models

Five of the logistic regression models yielded errors in the estimation procedure; barcode sticker, custom container, returnable shipping equipment, and take-back unsold merchandise models for garden centers, and returnable shipping equipment model for mass-merchandisers. It is important to recognize that those models in which the GEE algorithm failed to converge, were models in which there were very few inclusion cases reported by the growers. Considering that those growers with inclusions were very likely to have similar characteristics, was not surprising that the explanatory variables isolated and identified those inclusion cases, which in turn caused the logistic regression algorithm to fail, because was trying to estimate an infinite slope.

Of the models that failed to converge, only two were able to run with the exclusion of just one variable, which were the returnable shipping equipment models for both mass-merchandisers and garden centers. The variable that was deleted from the model specification was ‘internet’. This variable was significant in many of the logistic regression models, and was considered as one of the most important variables in terms of explaining the likelihood of a given item being present or not in the terms of a contract. Results are presented for the logistic regression models for returnable shipping equipment without ‘internet’, but these two models, along with the other problematic models, were evaluated using a different procedure.

An alternative approach to logistic regression, the ‘regression tree’, was used for those models for which the GEE algorithm didn’t converge. Regression tree, or recursive partitioning algorithm (RPA), is a flexible, non-parametric, data-driven procedure, which has been in use since the early 1970’s, both as a classification and as a prediction tool. However, its use in

economics so far has been rare (Bhattacharyya, 1999). Breinman et al. presented the theoretical exposition of RPA in 1984. The essence of RPA is to develop a classification tree that partitions observations based on binary splits of characteristic variables. The decision rules for splitting the dataset are determined from the data, and each rule contains only a subset of predictor variables. Some variables may never be used (Chambers, Hastie, 1993). Each individual split is based on a single predictor variable, and is chosen to minimize variability in the response variable in each of the resulting subsets, creating nodes or clusters of data with similar characteristics. The selection and partitioning process occurs repeatedly until no further divisions of a characteristic variable is possible, or the process is stopped by some predetermined criteria (Novak, LaDue, 1999). For the purposes of this study, the different regression trees were run in order to identify variables responsible for categorizing, or classifying observations into relatively homogeneous groups. It is important to note that no significance tests were conducted. Instead, results of the regression trees were examined to evaluate if the important variables identified by this analysis were consistent with results from the logistic regression models.

Chapter 4. Results

4.1. Descriptive Statistics

The frequencies of the nine dependent variables by marketing channel are presented in Tables 4.01 and 4.02. The tables present the frequencies of the different items in the terms of contract for the years 1996 and 2001, while also reporting the overall frequencies of the sum of both years, and the overall percentage of inclusion pooling information for 1996 and 2001. The most common items reported by growers to be in the terms of contracting with mass-merchandisers were 'product information tags' (53.94 %), 'transportation to retailer' (48.68 %), and 'barcode stickers' (40.78 %). The fourth most common arrangement was 'on-time delivery', with 32.89 % of growers reporting having this type of arrangement with mass-merchandisers while 28.94 % reported 'minimum volume' arrangements, and 27.63 % reported having 'continuous inventory replenishment' specifications. The three least common items were 'returnable shipping equipment', 'custom containers' and 'take-back unsold merchandise'. Only 11.84 % of growers reported returnable shipping equipment arrangements, while 22.36 % reported 'custom container' specifications, and 23.68 % of growers reported 'take-back' policies for unsold merchandise.

The most common items reported by growers to be in the terms of a contract with garden centers were 'product information tags', 'transportation to retailer', and 'on-time delivery'. In both market channels, the most common items were product information tags and transportation to retailer. For garden centers, 50 % of growers reported 'product information tags' arrangements, followed by 'transportation to retailer' with 44.73 %, and 'on-time delivery' item with 40.78 %. Minimum volume arrangements were present in the terms of contract in 31.57 % of the cases, while continuous inventory replenishment accounts were included in 15.78 % of the

observations. About 10.52 % of growers reported having returnable shipping equipment specifications in the terms of contract with garden centers. The least reported items were 'custom container' (9.21 %), 'barcode sticker' (6.58%), and 'take-back unsold merchandise' specifications (5.26 %).

Comparing the frequencies by market channel for the year 2001, growers were requested to provide 'barcode sticker', 'custom containers', 'transportation to retailer', 'returnable shipping equipment', 'take-back of unsold merchandise', and 'continuous inventory replenishment' arrangements more frequently by mass-merchandisers than garden centers. In contrast, 'product information tags', 'on-time delivery', and 'minimum volume' were more frequently requested by garden centers than by mass-merchandisers. The visual examination of the data indicates that the only unanticipated result was that growers got more requests to include 'product information tags' from garden centers than from mass-merchandisers, but in practical terms the difference was only one grower.

Table 4.01 - Dependent Variables and Their Frequency For Mass-Merchandisers

	Year				Overall Total		Overall Percentage	
	1996		2001					
Item	Yes	No	Yes	No	Yes	No	Yes	No
Product Information Tags	19	19	22	16	41	35	53.94	46.05
Barcode Sticker	11	27	20	18	31	45	40.78	59.21
Custom Containers	4	34	13	25	17	59	22.36	77.63
Transportation to Retailer	17	21	20	18	37	39	48.68	51.31
Returnable Shipping Equipment	2	36	7	31	9	67	11.84	88.15
On-time Delivery	12	26	13	25	25	51	32.89	67.10
Take Back Unsold Merchandise	6	32	12	26	18	58	23.68	76.31
Minimum Volume	11	27	11	27	22	54	28.94	71.05
Continuous Inventory Replenishment	8	30	13	25	21	55	27.63	72.36

Source: Ornamental Horticulture Producer Survey

Contrary to what was expected, eight growers reported having continuous inventory replenishment arrangements with garden centers, and two growers stated that they had 'take back unsold merchandise' requirements with garden centers. Also, no growers were expected to only

have ‘continuous inventory replenishment’ while dealing with mass-merchandisers, but eleven growers responded that they had minimum volume conditions.

Table 4.02 - Dependent Variables and Their Frequency for Garden Centers

	Year						Overall	
	1996		2001		Overall Total		Percentage	
Item	Yes	No	Yes	No	Yes	No	Yes	No
Product Information Tags	15	23	23	15	38	38	50	50
Barcode Sticker	0	38	5	33	5	71	6.578	93.42
Custom Containers	4	34	3	35	7	69	9.210	90.78
Transportation to Retailer	16	22	18	20	34	42	44.73	55.26
Returnable Shipping Equipment	4	34	4	34	8	68	10.52	89.47
On-time Delivery	14	24	17	21	31	45	40.78	59.21
Take Back Unsold Merchandise	2	36	2	36	4	72	5.263	94.73
Minimum Volume	10	28	14	24	24	52	31.57	68.42
Continuous Inventory Replenishment	4	34	8	30	12	64	15.78	84.21

Source: Ornamental Horticulture Producer Survey.

Table 4.03 consists of the descriptive statistics for the continuous variables included in the logit models. The variable ‘sales’ is measured in $10,000, and the 38 observations yielded a mean sales value of $778,165.50, with a minimum of $10,000. The maximum sales value observed cannot be disclosed because respondents were assured that their responses were going to remain confidential. The variable ‘big four buyer’ was included in the questionnaire to reflect the percentage of total sales going to the largest four buyers. The mean of the buyer concentration ratio was 44.89 %, with a standard deviation of 27.41 and a minimum of 4% and a maximum of 100%. Average space dedicated to greenhouse production and field production was 42,638.77 sq. ft. and 49.25 acres respectively. The largest greenhouse operation reported has 174,241 sq. ft., and the largest field production nursery reported 450 acres in production.

The variable sales involvement reflects the percentage of sales done outside the nursery facilities, such as trade shows and salesperson assigned to geographic territories, and it has a mean of 20%.

Table 4.03 – Continuous Variable Descriptive Statistics

Variable	Unit	N	Mean	Std. Dev.	Minimum	Maximum
Sales	$ 10,000	38	77.8166	161.2222	1.00	XXX
Big Four Buyers	Percentage	38	44.89	27.41	4.00	100.00
Field Production	Acres	28	49.25	102.29	0.25	450.00
Greenhouse Production	Sq. Ft.	25	42638.77	48515.73	200	174241.00
Sales Involvement	Percentage	38	20.00	29.82	0.00	100.00
Debt/Asset Ratio	Percentage	38	17.32	21.22	0.00	69.00

Source: Ornamental Horticulture Producer Survey.

In terms of the legal organization of the firms in the sample, there were 15 corporations. The remaining 23 observations were either sole proprietors or partnerships. For reasons explained in the methodology section, the latter were grouped together (Table 4.04). In addition, 23 firms reported using the Internet for e-mail, business-to-business or promotion purposes. The other 14 firms had no Internet use. The variable debt portrays the number of firms that had a debt/asset ratio of zero; 24 firms reported having a non-zero debt/asset ratio, and 14 firms reported having no debt.

Table 4.04 - Frequencies of Categorical Variables

	Corporations		Internet		Debt	
	Yes	No	Yes	No	Yes	No
Frequency	15	23	24	14	24	14
Percent	39.47	60.53	63.16	36.84	63.16	36.84

Source: Ornamental Horticulture Producer Survey.

4.2. Objective One, Part A

4.2.1. McNemar's Test for Product Information Tags by Market Channel

According to the growers' response, the null hypothesis is not rejected ($P > 0.257$). There is insufficient evidence to suggest that in contracts between growers and mass-merchandisers, 'product information tags' were more frequently requested in 2001 rather than 1996.

Conversely, for the garden center market channel, the null hypothesis is rejected ($P > 0.011$). More 'product information tag' arrangements were made between growers and garden centers in the year 2001 relative to the year 1996. In addition to the interpretation of the p-value

to judge if a test was significant, the 95 % confidence intervals were used to test the same hypothesis. The advantage of interpreting the confidence interval is that in addition to revealing significance, it provides an indication of the direction of the change in proportion. Interpreting the 95 % confidence intervals for the garden center market channel, the probability that the grower accepts this item in the terms of a contract was between 0.061 and .358 higher in 2001 (Table 4.05.)

Table 4.05 - McNemar's Test for Product Information Tags by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	1.2857	6.4
DF	1	1
P > S	0.2568	0.0114
Var.	0.004679224	0.005760453
SE	0.068404856	0.075897651
Difference of Sample Proportions	0.08	0.21
95 % Lower Conf. Limit	-0.054073519	0.061240604
95 % Upper Conf. Limit	0.214073519	0.358759396

Source: Ornamental Horticulture Producer Survey.

4.2.2. McNemar's Test for Barcode Stickers by Market Channel

Examining the effect of time on the inclusion of 'barcode sticker' in contracts between mass-merchandisers and growers, the null hypothesis was rejected (P > .007). The McNemar's test indicates that more contracts included 'barcode sticker' specifications in 2001 versus 1996. Using the 95 % confidence interval, the probability of growers accepting this item in the terms of contract increased between 0.086 and 0.394 (Table 4.06). In an analogous analysis for the garden center market channel, the null hypothesis was rejected (P > 0.025). A higher proportion of contracts between growers and garden centers included this item in the terms of contract in the year 2001. The increase in the probability that 'barcode sticker' was accepted by growers was between 0.023 and 0.237 higher in 2001 than in 1996.

Table 4.06 - McNemar's Test for Barcode Sticker by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	7.3636	5
DF	1	1
P > S	0.0067	0.0253
Var.	0.00614193	0.002976316
SE	0.078370468	0.054555621
Difference of Sample Proportions	0.24	0.13
95 % Lower Conf. Limit	0.086393882	0.023070983
95 % Upper Conf. Limit	0.393606118	0.236929017

Source: Ornamental Horticulture Producer Survey.

4.2.3. McNemar's Test for Custom Containers by Market Channel

Examining the P-value of 0.0126, one can see that the probability of a contract including a 'custom container' clause between growers and mass-merchandisers increased from 1996 to 2001 (Table 4.07). The null hypothesis was rejected. The probability of growers accepting this item increased between 0.037 and 0.383 in 2001. At the same time, there was insufficient evidence to suggest that the probability of including this item in the terms of a contract between garden centers and growers had changed (P > 0.317).

Table 4.07 - McNemar's Test for Custom Containers by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	6.2308	1
DF	1	1
P > S	0.0126	0.3173
Var.	0.007785763	0.018226994
SE	0.088236972	0.135007384
Difference of Sample Proportions	0.21	-0.03
95 % Lower Conf. Limit	0.037055535	-0.294614473
95 % Upper Conf. Limit	0.382944465	0.234614473

Source: Ornamental Horticulture Producer Survey.

4.2.4. McNemar's Test for Transportation to Retailers by Market Channel

According to the McNemar's test conducted to evaluate the effect of time on the presence of the item requiring producers to transport the merchandise to the retailer, there was insufficient

evidence to indicate that the probabilities of inclusion had changed. The null hypothesis was not rejected for either, mass-merchandisers or garden centers market channel.

Table 4.08 - McNemar's Test for Transportation to Retailer by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	1.8	1
DF	1	1
P > S	0.1797	0.3173
Var.	0.003300233	0.002687323
SE	0.057447657	0.051839398
Difference of Sample Proportions	0.08	0.05
95 % Lower Conf. Limit	-0.032597407	-0.051605221
95 % Upper Conf. Limit	0.192597407	0.151605221

Source: Ornamental Horticulture Producer Survey.

4.2.5. McNemar's Test for Returnable Shipping Equipment by Market Channel

For the item 'grower has to provide returnable shipping equipment', the null hypothesis was rejected for the mass-merchandiser market channel (P > 0.025). It was concluded that the probability that this term was accepted by the grower to be in the contract with mass-merchandisers had increased between 1996 and 2001. The probability of inclusion was between 0.025 and 0.235 higher (Table 4.09). On the other hand, for garden centers, there was insufficient evidence to suggest that the number of growers that accepted this item in the terms of contract had changed between 1996 and 2001. Since the confidence interval includes zero, with values of –0.078 and 0.078, the null hypothesis was not rejected.

Table 4.09 - McNemar's Test for Returnable Shipping Equipment by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	5	0
DF	1	1
P > S	0.0253	1
Var.	0.002874406	0.001580682
SE	0.053613486	0.039757796
Difference of Sample Proportions	0.13	0
95 % Lower Conf. Limit	0.024917567	-0.077925279
95 % Upper Conf. Limit	0.235082433	0.077925279

Source: Ornamental Horticulture Producer Survey.

4.2.6. McNemar's Test for On-time Delivery by Market Channel

According to Table 4.10, there was insufficient evidence to suggest that the number of growers accepting an on-time delivery specification in the terms of contract changed between 1996 and 2001, for either marketing channel. The null hypothesis was not rejected given the p-value of 0.317 for mass-merchandisers, and the p-value of 0.179 for garden centers.

Table 4.10 - McNemar's Test for On-time Delivery by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	1	1.8
DF	1	1
P > S	0.3173	0.1797
Var.	6.97040E-04	0.003316562
SE	0.026401522	0.057589601
Difference of Sample Proportions	0.02	0.08
95 % Lower Conf. Limit	-0.031746984	-0.032875619
95 % Upper Conf. Limit	0.071746984	0.192875619

Source: Ornamental Horticulture Producer Survey.

4.2.7. McNemar's Test for Take Back Unsold Product by Market Channel

The hypothesis that 'take back unsold merchandise' proportions did not change from 1996 to 2001 was not rejected, at an alpha level of 0.05. However, if an alpha level of 0.10 is used the number of growers reporting take back policies in their contracts with mass-merchandisers had changed significantly since 1996 (Table 4.11).

Table 4.11 - McNemar's Test for Take Back Unsold Product by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	3.6	N/A
DF	1	1
P > S	0.0578	N/A
Var.	0.006347281	0.022375711
SE	0.079669825	0.149585129
Difference of Sample Proportions	0.16	0
95 % Lower Conf. Limit	0.003847144	-0.293186852
95 % Upper Conf. Limit	0.316152856	0.293186852

Source: Ornamental Horticulture Producer Survey.

On the other hand, the McNemar's test for comparison of two dependent proportions cannot be computed for the garden center marketing channel because there was no change in the proportion between 1996 and 2001. The 95 % confidence intervals limits were -0.293 and 0.293 respectively, and there was insufficient evidence to reject the null hypothesis. On average, the number of growers reporting take back policies in the terms of contract with garden centers had changed between the years 1996 and 2001 (Table 4.11).

4.2.8. McNemar's Test for Minimum Volume by Market Channel

Because P > 1 does not fall in the critical region at the 0.05 level, the null hypothesis was not rejected for the mass-merchandiser marketing channel. There was insufficient evidence to indicate that changes in the number of growers reporting 'minimum volume' contract specifications had occurred between 1996 and 2001. On the other hand, P > 0.046 falls in the critical region. The null hypothesis for the garden center customers was rejected. It was concluded that, on average, the proportion of growers including 'minimum volume' arrangements in the terms of contract had increased significantly between 1996 and 2001. The probability of the grower accepting this item in the terms of contract was between 0.013 and 0.207 higher in the year 2001 (Table 4.12).

Table 4.12 - McNemar's Test for Minimum Volume by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	0	4
DF	1	1
P > S	1	0.0455
Var.	0.00139669	0.002449738
SE	0.037372322	0.049494824
Difference of Sample Proportions	0	0.11
95 % Lower Conf. Limit	-0.073249752	0.012990146
95 % Upper Conf. Limit	0.073249752	0.207009854

Source: Ornamental Horticulture Producer Survey.

4.2.9. McNemar's Test for Continuous Inventory Replenishment by Market Channel

For 'continuous inventory replenishment' specifications, P > 0.096 did not fall in the critical region at the 0.05 level, but the null hypothesis was rejected an at alpha level of 0.10. In conclusion, the proportion of growers including 'continuous inventory replenishment' arrangements in the terms of contract with mass-merchandisers had increased significantly between 1996 and 2001.On the other hand, since P > 0.046 falls in the critical region, the null hypothesis was rejected for the garden center market channel. It was concluded that, on average, the number of growers accepting continuous inventory replenishment specifications had increased significantly between 1996 and 2001. The probability of inclusion was between 0.013 and 0.207 higher in the year 2001 (Table 4.13).

Table 4.13 - McNemar's Test for Continuous Inventory Replenishment by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	2.7778	4
DF	1	1
P > S	0.0956	0.0455
Var.	0.005751443	0.00256829
SE	0.075838271	0.050678298
Difference of Sample Proportions	0.13	0.1
95 % Lower Conf. Limit	-0.018643011	6.70537E-04
95 % Upper Conf. Limit	0.278643011	0.199329463

Source: Ornamental Horticulture Producer Survey.

4.3. Objective One, Part B

4.3.1. McNemar's Test for All items in the Terms of a Contract by Market Channel

The second part of objective one involves evaluating if there was a change in proportions of all items in the terms of contract between the years 1996 and 2001. To test the hypothesis that, overall, more items were included in the terms of contract in the year 2001 in comparison with the year 1996 for mass-merchandisers and garden centers, a McNemar's test was employed. The

nine items included in the questionnaire were considered at the same time, and two tests were conducted, one for mass-merchandisers and one for garden centers.

The data are organized in a 2 x 2 table for each of the two marketing channels. The rows are the response categories for the year 1996, and the columns are the response categories for the year 2001. The two "main diagonals" indicate the total number of items all growers had not included in the terms of contract either in 1996 or 2001, and the total number of items all growers had included in the terms of contract for both years, respectively.

As can be seen in Table 4.14, the null hypothesis that there were no changes in the proportion of items reported in the terms of contract between growers and mass-merchandisers in the years 1996 and 2001 was rejected, with a p-value of less than 0.0001. By examining the 95 % confidence intervals, it was possible to conclude that the probability of growers accepting any given item in the terms of contract was between 0.0767 and 0.1633 higher in the year 2001.

For the garden center marketing channel, the null hypothesis also was rejected, with a p-value of less than 0.0001. By examining the 95 % confidence intervals, it was concluded that the probability of the grower accepting any given item in the terms of contract were between 0.0373 and 0.1027 higher in the year 2001 for the garden center market channel.

Table 4.14 - McNemar's Test for All Items in the Terms of Contract by Market Channel

	Mass-Merchandisers	Garden Centers
Statistic (S)	26.6825	17.8571
DF	1	1
P > S	< 0.0001	< 0.0001
Var.	0.00049	0.00028
SE	0.0221359	0.0167332
Difference of Sample Proportions	0.12	0.07
95 % Lower Conf. Limit	0.0767	0.0373
95 % Upper Conf. Limit	0.1633	0.1027

Source: Ornamental Horticulture Producer Survey.

4.4. Objective Two

A logit model was constructed for each of the items in the terms of contract, for both market channels; mass-merchandisers and garden centers. The objective of the models was to test whether the presence (or absence) of a given item in the terms of a contract can be explained by different firm characteristics. The presence of an individual item in the terms of contract is a function of legal organization of the business and general characteristics of Louisiana nurseries, as well as the control variable year. The control variable year is introduced into the model to take into consideration the effect of time on the probability that a given item is included in the terms of contract or not. In order to test the significance of the model, the likelihood ratio test was conducted. This test yields a chi-squared statistic with degrees of freedom equal to the number of variables in the restricted model minus the number of variables in the unrestricted model (model with just the intercept). For the purposes of this study, the chi-squared statistic had 7 degrees of freedom (Table 4.15 and Table 4.16).

Table 4.15 - Results for Likelihood Ratio Hypothesis Testing for Mass-Merchandiser Models

Model	Chi-square	df	Critical Chi-square
Product Information Tags	23.783	7	14.07
Barcode Sticker	32.116	7	14.07
Custom Containers	13.701	7	14.07
Transportation to Retailer	36.241	7	14.07
Returnable Shipping Equipment	12.494	7	14.07
On-time Delivery	23.301	7	14.07
Take Back Unsold Merchandise	28.804	7	14.07
Minimum Volume	26.537	7	14.07
Continuous Inventory Replenishment	10.601	7	14.07

Source: Ornamental Horticulture Producer Survey.

It is important to note that each of the equations presented in this part of the study is modeling the probability of inclusion over the time frame 1996 and 2001. The interpretations of these probabilities, or odds of inclusion, are based on longitudinal data and should be interpreted

accordingly. An explicit mention of this is going to be made in the first model for the mass-merchandiser and the garden center marketing channel.

Table 4.16 - Results for Likelihood Ratio Hypothesis Testing for Garden Center Models

Model	Chi-square	df	Critical Chi-square
Product Information Tags	22.201	7	14.07
Barcode Sticker	N/A	7	14.07
Custom Containers	N/A	7	14.07
Transportation to Retailer	33.569	7	14.07
Returnable Shipping Equipment	11.578	7	14.07
On-time Delivery	17.875	7	14.07
Take Back Unsold Merchandise	N/A	7	14.07
Minimum Volume	34.722	7	14.07
Continuous Inventory Replenishment	12.963	7	14.07

Source: Ornamental Horticulture Producer Survey.

4.4.1. Product Information Tags – Mass-Merchandisers

As can be seen in Table 4.15, the likelihood ratio test yields a chi-square greater than the critical chi-square, indicating that the null hypothesis is rejected and it can be concluded that the model is significant at the 0.05 level.

The variable ‘big four buyers’ is significant at the 0.05 level, although the sign was not as hypothesized (Table 4.17). However, the reason for this might be that as the percentage of sales going to the biggest four buyers increased, the dependence of the grower on the buyer increased. One possible explanation for the nature of this relationship is that growers with a diversified customer base can risk accepting the buyer’s demands. On the other hand, firms that don’t have a diversified customer base are more reluctant to agree to the inclusion of any of the given items, because their exposure is substantially higher. The interpretation in odds was that an increase of one unit in ‘big four buyers’ resulted in a reduction in the odds of inclusion of 3 % over the time period of this study. To be able to interpret the coefficient in odds, the Exp ß was calculated, and the result is 0.970. The Exp ß minus one, times one hundred yielded the odds interpretation as a percentage. Since the odds of inclusion, in this case, was that the item product information tags

was included in the terms of contract, it can be said that as concentration increases by one percent, the odds of including this item decrease by 3 %. It is important to bear in mind that when the variables were interpreted, *ceteris paribus* was assumed. This means that the interpretation holds as long as everything else in the models is held the same.

Table 4.17 - Regression Results, Product Information Tags, Mass-Merchandisers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	1.397	1.283	1.090	0.276	4.044
Year	-0.437	0.382	-1.140	0.253	0.646
Sales	0.006	0.004	1.440	0.150	1.006
Legal organization	0.112	0.734	0.150	0.879	1.118
Big four buyers	-0.030	0.013	-2.420	0.016	0.970
Internet	-1.246	0.807	-1.540	0.123	0.288
Debt	0.871	0.778	1.120	0.263	2.389
Outsales	0.004	0.012	0.370	0.714	1.004
Log-likelihood Unrestricted			-52.442		
Log-likelihood Restricted			-40.551		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

The classification tables for each of the models are going to be presented. Although the prediction accuracy is not a good measure for goodness of fit of model fitting, it is certainly useful to measure prediction power generated from the fitted model. There are two main reasons why prediction accuracy is not a good measure of the model's fit. First, model outcome is measured on a continuum, from zero to one, but the predicted outcome is binary, and second, the prediction accuracy depends on the distribution of the estimated probability. The classification tables provide a sensitivity ratio, a specificity ratio, and an overall measure of how well the model predicts all outcomes. The sensitivity ratio consists of the number of correctly classified inclusions over the total number of inclusions. On the other hand, the specificity ratio consists of the number of correctly classified non-events over the total number of non-events. The overall measure of predictive power consists of the total number of correctly classified events and non-events, over the total number of observations. An inclusion, or event, means that the respective

item was included in the terms of contract, and a non-event means that a given item was excluded from the terms of contract. Both, sensitivity and specificity, are very sensitive to the cut-point in the classification. In all of the models, the classification cut-point is 0.5. If the predicted probability of one observation is 0.45, for example, that particular observation was classified as a non-event, or exclusion. Conversely, if the predicted probability of one observation is 0.55, for example, that particular observation was classified as an event, or inclusion.

Table 4.18 is the classification table for the product information tags model for mass-merchandisers. The first number in the far right column is the specificity ratio, measuring the percentage of correctly classified exclusions. In this case 65.71 % of exclusions were correctly classified. The second number on that column is the sensitivity ratio, measuring the total number of correctly classified inclusions; in this case, it was 80.49 %. It can be seen that the model predicts inclusions better than exclusions. The overall percentage of correctly classified predictions was 73.68 % (Table 4.18.)

Table 4.18 Classification Table for Product Information Tags, Mass-Merchandisers.

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	23.00	12.00	65.71
Included	8.00	33.00	80.49
Overall Percentage			73.68

Source: Ornamental Horticulture Producer Survey.

4.4.2. Product Information Tags – Garden Centers

The likelihood ratio test indicates that the model was significant, with a chi-square of 22.201, when the critical chi-square is 14.07 (Table 4.16). The null hypothesis that all coefficients are zero is rejected.

The variable 'big four buyers' is significant at the 0.05 level, with a p-value of 0.018, and the negative sign was not anticipated. The interpretation in odds was that an increase of one percent in the 'big four buyers' resulted in a reduction in the odds of inclusion of 3 % over the time period between 1996 and 2001 (Table 4.19).

In addition, the variable 'year' was significant at the 0.05 level, with a p-value of 0.006. The probability that any given item was included in the terms of a contract was hypothesized to increase from 1996 to 2001. The odds of 'product information tag' being included in the terms of contract were 67 % lower in 1996 relative to 2001.

Table 4.19 - Regression Results, Product Information Tags, Garden Centers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	1.842	1.153	1.600	0.110	6.310
Year	-1.113	0.401	-2.770	0.006	0.329
Sales	0.002	0.002	1.110	0.267	1.002
Legal organization	-0.070	0.680	-0.100	0.918	0.933
Big four buyers	-0.031	0.013	-2.360	0.018	0.970
Internet	-1.105	0.712	-1.550	0.121	0.331
Debt	1.005	0.714	1.410	0.159	2.732
Outsales	-0.002	0.012	-0.130	0.896	0.999
Log-likelihood Unrestricted			-52.679		
Log-likelihood Restricted			-41.579		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

Table 4.20 - Classification Table for Product Information Tags, Garden Centers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	27.00	11.00	71.05
Included	11.00	27.00	71.05
Overall Percentage			71.05

Source: Ornamental Horticulture Producer Survey.

Table 4.20 is the classification table for the product information tags model for garden centers. For this model, 71.05 % of non-events were correctly classified, and 71.05 % of events were correctly classified. The overall percentage of correctly classified predictions was 71.05 %.

4.4.3. Barcode Stickers – Mass-Merchandisers

The model was significant, with a chi-square of 32.1158 versus a critical chi-square of 14.07 (Table 4.15). The null hypothesis that all coefficients are zero was rejected.

The variable 'Internet' had a p-value of 0.037 and was significant at an α level of 0.05. The odds of inclusion were 95.2 % lower for firms having no access to Internet relative to those who had access to Internet (Table 4.21).

'Year' was significant as judged by the p-value of 0.011. The odds of barcode sticker being included in the terms of contract were 77.6% lower in 1996 relative to 2001. This result was consistent with the McNemar's test performed in objective one.

Table 4.21 - Regression Results, Barcode Sticker, Mass-Merchandisers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	2.064	1.314	1.570	0.116	7.875
Year	-1.495	0.585	-2.550	0.011	0.224
Sales	0.001	0.002	0.550	0.583	1.001
Legal organization	-0.273	0.670	-0.410	0.683	0.761
Big four buyers	-0.030	0.015	-1.950	0.051	0.970
Internet	-3.045	1.457	-2.090	0.037	0.048
Debt	1.334	1.127	1.180	0.237	3.797
Outsales	0.001	0.011	0.090	0.928	1.001
Log-likelihood Unrestricted			-51.382		
Log-likelihood Restricted			-35.324		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

The variable 'big four buyers' was significant at an $\alpha = 0.10$ level, with a p-value of 0.051, but the sign was unanticipated. The interpretation in odds is that an increase of one percentage of sales going to the biggest four buyers would result in a reduction in the odds of

inclusion of 3 %.Table 4.22 is the classification table for the 'barcode sticker' model for mass-merchandisers. For this model, 86.67 % of non-events were correctly classified, and 76.92 % of events were correctly classified. It can be seen that non-events were predicted better than events. The overall percentage of correctly classified predictions was 83.10 %. The model can be said to have good predictive power, not only because of the good overall measure of predictive power, but because it classified events and non-events reasonably well.

Table 4.22 -Classification Table for Barcode Sticker, Mass-Merchandisers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	39	6	86.67
Included	6	20	76.92
Overall Percentage			83.10

Source: Ornamental Horticulture Producer Survey.

4.4.4. Barcode Stickers – Garden Centers

The SAS software package reports an error during the statistical estimation procedure. It states that the generalized Hessian matrix is not positive definite. This type of error is generally caused by multicollinearity in the sample, or when the logistic regression is attempting to estimate an infinite slope. No collinearity was detected in the final model specification, as presented in the methodology section. The fact that very few respondents included barcode sticker specifications in the terms of contract might cause some variables to perfectly discriminate between inclusions and exclusions, hence the error in the iteration procedure, because the procedure is trying to estimate an infinite slope.

A reference to the very few inclusion cases in this particular model has already been made. However, it is important to note that no growers included barcode sticker specifications in the year 1996, and only five growers out of a total of 38, or 13 % included this item in the terms of contract in 2001. Assuming that the sample is representative of the population, even if it were

possible to run this particular model, its use would be somewhat limited given that very few growers reported this specification in the terms of contract. With the small sample size and the number of inclusions it's impossible to know if those individuals were outliers or this item was included on a regular basis.

Attempting to find all the possible combinations of the variables used in constructing the models that would allow the GEE algorithm to converge yielded one possible model in which only two variables were present; 'year' and 'outsales'. This model will not be presented. A similar problem is encountered in other models.

4.4.5. Custom Containers – Mass-Merchandisers

The null hypothesis that all coefficients are zero was not rejected because the chi-square statistic of 13.70 does not lie in the critical region (Table 4.15). The model was not significant.

'Year' was significant with a p-value of 0.021, and the sign was as expected. The odds that custom container specifications were included in the terms of contracting are 86.9% lower in the year 1996 (Table 4.23).

Table 4.23 - Regression Results, Custom Containers, Mass-Merchandisers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	1.296	1.049	1.240	0.217	3.656
Year	-1.639	0.708	-2.310	0.021	0.194
Sales	-0.001	0.002	-0.650	0.515	0.999
Legal organization	-0.442	0.617	-0.720	0.474	0.643
Big four buyers	-0.021	0.011	-1.860	0.063	0.980
Internet	-1.433	1.000	-1.430	0.152	0.239
Debt	-0.434	0.855	-0.510	0.612	0.648
Outsales	-0.005	0.010	-0.530	0.597	0.995
Log-likelihood Unrestricted			-40.392		
Log-likelihood Restricted			-33.542		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

The variable 'big four buyers' was significant at an $\alpha = 0.10$ level, with a p-value of 0.063, but the negative sign was not anticipated. An increase of one percent in sales to the biggest four buyer's results in a decrease of 2 % in the odds of inclusion.

Table 4.24 is the classification table for the custom containers model for mass-merchandisers. For this model, 98.31 % of all non-events were correctly classified, and only 43.75 % of events were correctly classified. The overall percentage of correctly classified predictions was 86.67 %. The predictive power of this model was not very good, because only a small percentage of events were correctly classified.

Table 4.24 - Classification Table For Custom Containers, Mass-Merchandisers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	58.00	1.00	98.31
Included	9.00	7.00	43.75
Overall Percentage			86.67

Source: Ornamental Horticulture Producer Survey.

4.4.6. Custom Containers – Garden Centers

The SAS software package reports an error during the statistical estimation procedure, as explained in the 'barcode sticker' model for garden centers. Only 4 growers, or 10.53 %, reported having included custom container specifications in the terms of contract for the year 1996, and 3, or 7.89 %, reported having included the same item in the year 2001. Assuming that the sample is representative of the population, even if it were possible to run this particular model, its use would be somewhat limited given that very few growers include this type of specification in the terms of contract.

Attempting to find all the possible combinations of the variables used in constructing the models that would allow the GEE algorithm to converge yielded one possible model with four

explanatory variables; 'year', 'sales', 'big four buyers', and 'outsales'. This model will not be presented.

4.4.7. Transportation to Retailer – Mass-Merchandisers

The null hypothesis that the coefficients for all of the explanatory variables, except the constant, are zero was rejected, since the likelihood ratio test yielded a chi-square of 36.24 versus a critical chi-square of 14.07 (Table 4.15).

The variable 'debt' was significant at an $\alpha = 0.05$, and the odds interpretation was that a firm with no debt had 1644% higher odds of inclusion than firms with debt (Table 4.25).

'Outsales' had a positive sign and was significant with a p-value of 0.018. A one-unit increase in the percentage of high involvement sales results in an increase in the odds of inclusion of 3.7 %.

The variable 'Internet' was significant at an α level of 0.10, with a p-value of 0.057. A firm having no Internet had 91.9% lower odds of inclusion than firms having Internet.

Table 4.25 - Regression Results, Transportation to Retailer, Mass-Merchandisers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	-1.275	1.180	-1.080	0.280	0.280
Year	-0.531	0.395	-1.340	0.179	0.588
Sales	0.003	0.002	1.530	0.125	1.003
Legal organization	-0.579	0.837	-0.690	0.489	0.561
Big four buyers	0.016	0.014	1.170	0.243	1.016
Internet	-2.511	1.321	-1.900	0.057	0.081
Debt	2.859	1.407	2.030	0.042	17.441
Outsales	0.037	0.016	2.370	0.018	1.037
Log-likelihood Unrestricted			-52.653		
Log-likelihood Restricted			-34.532		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

For this model, 89.74 % of all non-events were correctly classified, and 75.68 % of events were correctly classified. The overall percentage of correctly classified predictions was

82.89 %. The predictive power of this model was good, taking into account that both, the sensitivity and specificity ratios were acceptable, as well as the overall measure of correctly classified events and non-events (Table 4.26.)

Table 4.26 - Classification Table for Transportation to Retailer, Mass-Merchandisers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	35.00	4.00	89.74
Included	9.00	28.00	75.68
Overall Percentage			82.89

Source: Ornamental Horticulture Producer Survey.

4.4.8. Transportation to Retailer – Garden Centers

The null hypothesis that the coefficients for all of the explanatory variables, except the constant, are zero was rejected, because the likelihood ratio test yields a chi-square of 33.57 versus a critical chi-square of 14.07 (Table 4.16).

The variable 'debt' was significant at an $\alpha = 0.05$, having a p-value of 0.004. A firm with no debt has 830.7% higher odds of inclusion relative to firm reported having some degree of debt (Table 4.27).

The variable 'Internet' was significant, with a p-value of 0.032. The odds of inclusion were 77.40 % lower for firms having no Internet relative to firms using Internet in their day-to-day operations.

'Legal organization' was significant, with a p-value of 0.005. The odds of inclusion for non-corporations were 88.60 % lower relative to corporations.

'Outsales' had a p-value of 0.056; therefore this variable was significant at an alpha level of 0.10. The odds of inclusion increased by 2.2% with a unit increase in the percentage of high involvement sales.

'Sales' had a p-value of 0.094, therefore this variable was significant at an alpha level of 0.10. A one-unit increase in 'sales' resulted in a decrease in the odds of inclusion by 1 %.

Table 4.27 - Regression Results, Transportation to Retailer, Garden Centers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	0.633	1.179	0.290	0.592	1.883
Year	-0.342	0.587	0.340	0.561	0.711
Sales	-0.010	0.006	2.810	0.094	0.990
Legal organization	-2.168	0.778	7.760	0.005	0.114
Big four buyers	0.010	0.013	0.630	0.427	1.010
Internet	-1.488	0.695	4.580	0.032	0.226
Debt	2.231	0.776	8.270	0.004	9.307
Outsales	0.022	0.011	3.650	0.056	1.022
Log-likelihood Unrestricted			-52.257		
Log-likelihood Restricted			-35.473		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

For transportation to retailer model, in the garden center market channel, 80.49 % of all exclusions were correctly classified, and 73.53 % of inclusions were correctly classified. The overall percentage of correctly classified predictions was 77.33 %. The predictive power of this model is good, taking into account that both the sensitivity and specificity ratios were acceptable. It's important to note that exclusions were predicted better than inclusions (Table 4.28.)

Table 4.28 - Classification Table for Transportation to Retailer, Garden Centers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	33.00	8.00	80.49
Included	9.00	25.00	73.53
Overall Percentage			77.33

Source: Ornamental Horticulture Producer Survey.

4.4.9. Returnable Shipping Equipment – Mass-Merchandisers

The SAS software package reports an error during the statistical estimation procedure, as it states that the generalized Hessian matrix is not positive definite. The possible causes for this type of error have been discussed before. Two growers, or 5.26 %, reported including this item in

the terms of contract in 1996. However, this number increased to seven growers in 2001, accounting for 18.42 % of the sample. The variable 'Internet' was taken out of the model, and the model was run with six explanatory variables plus the intercept.

The null hypothesis that all coefficients are zero was not rejected because the chi-square statistic of 12.49 does not lie in the critical region (Table 4.15). The model was not found to be significant.

Two variables were significant at an alpha level of 0.05, 'year', and 'sales'. 'Year' had a p-value of 0.044, and the odds of inclusion were 80.50 % lower in 1996 relative to 2001. On the other hand, 'sales' had a p-value of 0.004. An increase in sales of $10,000 increased the odds of inclusion by 0.50 %.

Table 4.29 - Regression Results, Returnable Shipping Equipment, Mass-Merchandisers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	-2.553	1.523	-1.680	0.094	0.078
Year	-1.637	0.814	-2.010	0.044	0.195
Sales	0.005	0.002	2.900	0.004	1.005
Legal organization	1.521	1.277	1.190	0.234	4.575
Big four buyers	-0.024	0.016	-1.490	0.137	0.976
Internet	0.734	0.925	0.790	0.427	2.084
Debt	0.011	0.012	0.920	0.359	1.011
Log-likelihood Unrestricted			-27.646		
Log-likelihood Restricted			-21.399		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

In the returnable shipping equipment model, for the mass-merchandiser market channel, 98.51 % of all exclusions were correctly classified, and only 11.11 % of inclusions were correctly classified. The overall percentage of correctly classified predictions was 88.16 %. The predictive power of this model was not good, since only one of the nine inclusions was correctly classified. Exclusions were predicted much better than inclusions (Table 4.30).

Table 4.30 - Classification Table for Returnable Shipping Equipment, Mass-Merchandisers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	66	1	98.51
Included	8	1	11.11
Overall Percentage			88.16

Source: Ornamental Horticulture Producer Survey.

4.4.10. Returnable Shipping Equipment – Garden Centers

The SAS software package reports an error during the statistical estimation procedure, as it states that the generalized Hessian matrix is not positive definite. The possible causes for this type of error have been discussed before. Four growers, or 10.52%, reported including this item in the terms of contract in 1996, and the same four growers reported including this item in the terms of contract in 2001. The variable 'Internet' was taken out of the model, and the model was run with 6 explanatory variables plus the intercept.

The null hypothesis that all coefficients are zero was not rejected because the chi-square statistic of 11.58 does not lie in the critical region (Table 4.16). The model was not found to be significant.

The only significant variable was 'outsales', with a p-value of 0.016. The sign was negative, contrary to what was expected. A possible reason for the negative relationship between this variable and the dependent variable was that as the percentage of high involvement sales increases, a broader customer base was reached as opposed to engaging in passive ways of selling nursery products. A broader customer base, in turn, might result in increased opportunities, making growers less likely to accept returnable shipping equipment specifications in the terms of contract. As the percentage of high involvement sales increased by 1 %, the odds of inclusion decreased by 4.70 % (Table 4.31).

The coefficient of the variable 'year' was zero because there were no changes in the inclusions from 1996 to 2001. The same four growers that included this item in the terms of contract in 1996 had also included this item in 2001.

Table 4.31 - Regression Results, Returnable Shipping Equipment, Garden Centers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	-0.309	2.093	-0.150	0.883	0.734
Year	0.000	0.481	0.000	1.000	1.000
Sales	-0.001	0.002	-0.470	0.639	0.999
Legal organization	-1.312	1.278	-1.030	0.305	0.269
Big four buyers	-0.027	0.020	-1.360	0.175	0.973
Internet	1.064	1.345	0.790	0.429	2.899
Debt	-0.048	0.020	-2.400	0.016	0.953
Log-likelihood Unrestricted			-25.574		
Log-likelihood Restricted			-19.785		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

Table 4.32 - Classification Table for Returnable Shipping Equipment, Garden Centers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	66	2	97.05
Included	8	0	0
Overall Percentage			86.84

Source: Ornamental Horticulture Producer Survey.

Table 4.32 shows the performance of the model in predicting inclusions and exclusions for the returnable shipping equipment item for garden centers. For this model, 97.05 % of all non-events were correctly classified, and no events were correctly classified. The overall percentage of correctly classified predictions was 86.84 %. The predictive power of this model was poor, since none of the observed inclusions were predicted.

4.4.11. On-time Delivery – Mass-Merchandisers

The likelihood ratio test comparing the unrestricted model versus the restricted model yielded a chi-square of 23.30, indicating that the model was significant, and the null hypothesis that all variable coefficients are zero was rejected (Table 4.15).

According to Table 4.33, 'Internet' was the only significant variable in this model, with a p-value of 0.004 (Table 4.33). A firm having no Internet had 93.60 % lower odds of inclusion than a firm having access to Internet.

Table 4.33 - Regression Results, On-time Delivery, Mass-Merchandisers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	-1.625	1.421	-1.140	0.253	0.197
Year	-0.163	0.161	-1.010	0.311	0.849
Sales	0.003	0.003	1.120	0.263	1.003
Legal organization	0.592	1.050	0.560	0.573	1.808
Big four buyers	0.003	0.019	0.180	0.855	1.003
Internet	-2.754	0.943	-2.920	0.004	0.064
Debt	1.062	0.975	1.090	0.276	2.891
Outsales	0.023	0.018	1.290	0.196	1.023
Log-likelihood Unrestricted			-48.141		
Log-likelihood Restricted			-36.49		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

Table 4.34 - Classification Table for On-time Delivery, Mass-Merchandisers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	38.00	13.00	74.51
Included	11.00	14.00	56.00
Overall Percentage			68.42

Source: Ornamental Horticulture Producer Survey.

For the returnable shipping equipment model above, 74.51 % of all exclusions were correctly classified, and 56 % of inclusions were correctly classified. The overall percentage of correctly classified predictions was 68.42 %. The predictive power of this model was not very good; the sensitivity ratio was low, while the specificity ratio was acceptable (Table 4.34).

4.4.12. On-time Delivery – Garden Centers

The likelihood ratio test comparing the unrestricted model versus the restricted model yielded a chi-square of 17.87, indicating that the model was significant, and the null hypothesis that all variable coefficients are zero was rejected (Table 4.16).

Table 4.35 - Regression Results, On-time Delivery, Garden Centers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	1.089	1.257	0.870	0.387	2.970
Year	-0.415	0.294	-1.410	0.158	0.660
Sales	-0.002	0.002	-0.920	0.359	0.998
Legal organization	0.496	0.925	0.540	0.592	1.642
Big four buyers	-0.015	0.014	-1.100	0.270	0.985
Internet	-2.432	0.859	-2.830	0.005	0.088
Debt	-0.188	0.807	-0.230	0.816	0.829
Outsales	0.004	0.021	0.190	0.846	1.004
Log-likelihood Unrestricted			-51.382		
Log-likelihood Restricted			-42.445		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

Table 4.36 - Classification Table - On-time Delivery, Garden Centers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	34.00	11.00	75.56
Included	10.00	21.00	67.74
Overall Percentage			72.37

Source: Ornamental Horticulture Producer Survey.

According to Table 4.35, ‘Internet’ was the only significant variable in this model, with a p-value of 0.005. A firm having no Internet has 91.20 % lower odds of inclusion than a firm having access to Internet.

For the on-time delivery model, 75.56 % of all exclusions were correctly classified, and 67.74 % of inclusions were correctly classified. The overall percentage of correctly classified predictions was 72.37 % (Table 4.36).

4.4.13. Take Back Unsold Merchandise –Mass-Merchandisers

As can be seen in Table 4.15, the likelihood ratio test yielded a chi-square greater than the critical chi-square. The null hypothesis was rejected and it was concluded that the model was significant at the 0.05 level.

The variable 'big four buyers' was significant at the 0.05 level, with a p-value of 0.001. As the percentage of sales going to the biggest four buyers increased by one unit, the odds of inclusion decreased by 5.1 % (Table 4.37).

The variable 'Internet' had a p-value of 0.001 and was significant. A firm having no Internet has 93.60 % lower odds of inclusion than a firm having access to Internet.

The variable 'debt' was significant at an $\alpha = 0.05$, with a p-value of 0.012. A firm with no debt had 648.7 % higher odds of inclusion relative to firms with debt.

'Year' was significant at an $\alpha = 0.10$, and the sign was negative, as expected. The odds of inclusion are 74.2 % lower in 1996 relative to 2001.

'Sales' had a p-value of 0.047. An increase in sales of $10,000 increased the odds of inclusion by 0.3 %.

Table 4.37 - Regression Results, Take Back Unsold Merchandise, Mass-Merchandisers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	0.240	1.157	0.210	0.836	1.271
Year	-1.354	0.696	-1.950	0.052	0.258
Sales	0.003	0.001	1.990	0.047	1.003
Legal organization	0.909	0.807	1.130	0.260	2.481
Big four buyers	-0.052	0.016	-3.330	0.001	0.949
Internet	-2.756	0.818	-3.370	0.001	0.064
Debt	2.013	0.804	2.500	0.012	7.487
Outsales	0.009	0.008	1.180	0.237	1.009
Log-likelihood Unrestricted			-41.603		
Log-likelihood Restricted			-27.201		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

For the above model, 94.83 % of all non-events were correctly classified, and 55.56 % of events were correctly classified. The overall percentage of correctly classified predictions was 85.53 %. The predictive power of this model not very good because the percentage of events correctly classified was too low (Table 4.38).

Table 4.38 - Classification Table for Take Back Unsold Merchandise, Mass-Merchandisers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	55.00	3.00	94.83
Included	8.00	10.00	55.56
Overall Percentage			85.53

Source: Ornamental Horticulture Producer Survey.

4.4.14. Take Back Unsold Merchandise – Garden Centers

The SAS software package reports an error during the statistical estimation procedure, as explained before. It is important to note that two growers, or 5.26 % of the total, reported this item in the terms of contract in 1996, and the same two growers reported this item in the terms of contract in 2001. Assuming that the sample was representative of the population, even if it were possible to run this particular model, its use would be somewhat limited given that very small proportion of growers that included this specification in the terms of contract.

Attempting to find all the possible combinations of the variables used in constructing the models that would allow the GEE algorithm to converge yielded one possible model with four variables and the intercept. The four variables were; ‘year’, ‘sales’, ‘legal organization’, and ‘big four buyers’. This model will not be presented.

4.4.15. Minimum Volume – Mass-Merchandisers

According to Table 4.15, the model was significant at an alpha level of 0.05. The chi-square statistic was 23.57, indicating that the null hypothesis that the coefficient of all variables, except the constant, are equal to zero was rejected.

'Debt' was found to be significant. Firms that had no debt exhibited 1161% higher odds of inclusion than firms that had debt (Table 4.39).

The variable 'Internet' was significant with a p-value of 0.021. Firms that had no access to Internet had 88.20% lower odds of inclusion than firms using the Internet in their day-to-day operations.

'Outsales' was significant at an alpha level of 0.10, with a p-value of 0.095. An increase of one unit in the percentage of high involvement sales resulted in an increase of 2.6% in the odds of inclusion.

The variable 'year' exhibits a coefficient of zero. The reason for this was that 11 growers included minimum volume specifications in 1996, and the same 11 growers indicated having included this item in the terms of contract in 2001.

For the 'minimum volume' model for mass-merchandisers, 88.89 % of all non-events were correctly classified, and 45.45 % of events were correctly classified. The overall percentage of correctly classified predictions was 76.32 %. The predictive abilities of the model are questionable because the percentage of correctly predicted events was very low (Table 4.40).

Table 4.39 - Regression Results, Minimum Volume, Mass-Merchandisers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	-1.389	1.440	-0.960	0.335	0.249
Year	0.000	0.264	0.000	1.000	1.000
Sales	0.004	0.004	1.160	0.247	1.004
Legal organization	0.063	0.871	0.070	0.942	1.065
Big four buyers	-0.027	0.020	-1.350	0.178	0.974
Internet	-2.134	0.921	-2.320	0.021	0.118
Debt	2.535	0.954	2.660	0.008	12.610
Outsales	0.025	0.015	1.670	0.095	1.026
Log-likelihood Unrestricted			-45.728		
Log-likelihood Restricted			-32.459		
No. Observations			76.000		

Source: Ornamental Horticulture Producer Survey.

Table 4.40 - Classification Table for Minimum Volume, Mass-Merchandisers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	48.00	6.00	88.89
Included	12.00	10.00	45.45
Overall Percentage			76.32

Source: Ornamental Horticulture Producer Survey.

4.4.16. Minimum Volume – Garden Centers

According to Table 4.16, the model was significant at an alpha level of 0.05. The chi-square statistic was 34.72. The null hypothesis that the coefficients of all variables, except the constant, are equal to zero was rejected.

According to Table 4.41, 'Internet' had a p-value of 0.005, indicating the variable was significant. Firms that had no access to Internet had 91.40 % lower odds of inclusion than firms using the Internet in their day-to-day operations.

'Year' was significant at an $\alpha = 0.05$, having a p-value of 0.023, and the sign was negative, as expected. The odds of inclusion were 55.70 % lower in 1996 relative to 2001.

Two variables were significant at an alpha level of 0.10; 'outsales' with a p-value of 0.79, and 'debt' with a p-value of 0.094. An increase of one percent in high involvement sales resulted in a 2.40 % increase in the odds of inclusion. On the other hand, the variable 'debt' exhibited a positive sign, which was not anticipated. Firms that had no debt exhibited 383.20 % higher odds of inclusion than firms that had debt.

The classification table for the minimum volume model for mass-merchandisers is presented in Table 4.42. For this model, 86.54 % of all non-events were correctly classified, and 62.50 % of events were correctly classified. The overall percentage of correctly classified predictions was 78.95 %. The low percentage of correct prediction of events makes the predictive ability of this model questionable (Table 4.42).

Table 4.41 - Regression Results, Minimum Volume, Garden Centers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	-1.742	1.820	-0.960	0.338	0.175
Year	-0.814	0.359	-2.270	0.023	0.443
Sales	0.012	0.011	1.130	0.260	1.012
Legal organization	0.313	0.835	0.037	0.708	1.367
Big four buyers	-0.005	0.016	-0.310	0.755	0.995
Internet	-2.454	0.868	-2.830	0.005	0.086
Debt	1.575	0.942	1.670	0.094	4.832
Outsales	0.024	0.014	1.750	0.079	1.024
Log-likelihood Unrestricted			-47.398		
Log-likelihood Restricted			-30.037		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

Table 4.42 - Classification Table for Minimum Volume, Garden Centers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	45.00	7.00	86.54
Included	9.00	15.00	62.50
Overall Percentage			78.95

Source: Ornamental Horticulture Producer Survey.

4.4.17. Continuous Inventory Replenishment – Mass-Merchandisers

The null hypothesis that all coefficients were zero was not rejected because the chi-square statistic of 10.60 did not lie in the critical region (Table 4.15). The model was not found to be significant.

'Sales', with a p-value of 0.011, was found to be significant at an alpha level of 0.05. An increase in sales of $10,000 resulted in an increase in the odds of inclusion of 0.3 % (Table 4.43).

'Debt' was significant at an alpha level of 0.10, with a p-value of 0.099. The odds of inclusion for a firm with no debt were 273.40 % higher than firms that had reported debt.

'Year' was also significant at an alpha level of 0.10, having a p-value of 0.095. The odds of inclusion are 53.20 % lower in 1996 relative to 2001.

For the continuous inventory replenishment model for mass-merchandisers, 94.55 % of all non-events were correctly classified, and only 23.81 % of events were correctly classified. The overall percentage of correctly classified predictions was 75 %. The predictive power of this model was only fair, because only a small percentage of events are correctly classified (Table 4.44).

Table 4.43 - Regression Results, Continuous Inventory Replenishment, Mass-Merchandisers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	-1.663	1.038	-1.600	0.109	0.190
Year	-0.759	0.455	-1.670	0.095	0.468
Sales	0.003	0.001	2.550	0.011	1.003
Legal organization	0.912	0.734	1.240	0.214	2.488
Big four buyers	-0.002	0.012	-0.190	0.852	0.998
Internet	-0.795	0.824	-0.960	0.335	0.452
Debt	1.318	0.797	1.650	0.099	3.734
Outsales	0.001	0.009	0.100	0.918	1.001
Log-likelihood Unrestricted			-44.797		
Log-likelihood Restricted			-39.496		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

Table 4.44 - Classification Table for Continuous Inventory Replenishment, Mass-Merchandisers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	52.00	3.00	94.55
Included	16.00	5.00	23.81
Overall Percentage			75.00

Source: Ornamental Horticulture Producer Survey.

4.4.18. Continuous Inventory Replenishment – Garden Centers

The null hypothesis that all coefficients are zero was not rejected because the chi-square statistic of 12.96 did not lie in the critical region (Table 4.16). The model was not found to be significant.

The only significant variable in this model was 'year', with a p-value of 0.022. The odds of inclusion were 60.90 % lower in 1996 relative to 2001 (Table 4.45).

Table 4.45 - Regression Results, Continuous Inventory Replenishment, Garden Centers

Variables	Estimate	Standard Error	Z	Pr > Z	Exp β
Intercept	-1.036	2.222	-0.470	0.641	0.355
Year	-0.940	0.409	-2.300	0.022	0.391
Sales	-0.025	0.027	-0.910	0.363	0.976
Legal organization	1.220	1.423	0.860	0.391	3.388
Big four buyers	-0.011	0.019	-0.600	0.551	0.989
Internet	0.056	0.885	0.060	0.950	1.058
Debt	0.308	0.907	0.340	0.734	1.361
Outsales	-0.012	0.014	-0.850	0.393	0.988
Log-likelihood Unrestricted			-33.148		
Log-likelihood Restricted			-26.667		
No. Observations			76		

Source: Ornamental Horticulture Producer Survey.

The classification table for the continuous inventory replenishment model for garden centers (Table 4.46). For this model, 98.44 % of all non-events were correctly classified, and only 16.67 % of all events were correctly classified. The overall percentage of correctly classified predictions was 85.53 %.

Table 4.46 - Classification Table for Continuous Inventory Replenishment, Garden Centers

	Predicted		
Observed	Excluded	Included	Percentage Correct
Excluded	63.00	1.00	98.44
Included	10.00	2.00	16.67
Overall Percentage			85.53

Source: Ornamental Horticulture Producer Survey.

4.4.19. Regression Tree for Barcode Stickers, Garden Centers

The regression tree is specified as the logistic regression equation, where the probability of inclusion in the terms of contract is hypothesized to be a function of 'year', 'sales', 'big four buyers', 'outsales', 'internet', 'debt', and 'legal organization'. The starting point of the regression tree, where no splits have occurred, is called the root. In this case, the root included 76

observations, of which only 6.57 % corresponded to inclusions (Table 4.47). An asterisk by the name of the variable indicates a terminal node. The variable that minimized the sum of squares of the response is 'year'. This result was expected, because no growers reported having included barcode sticker specifications in 1996, and five reported such specifications in 2001.

Table 4.47 - Regression Tree for Barcode Stickers, Garden Centers

Node	Split	N	Deviance	Yval
1)	Root	76	4.67	0.066
2)	Year 1996 *	38	0.00	0.000
3)	Year 2001	38	4.34	0.132
6)	Sales < $140,000	14	2.86	0.286
12)	No Internet Use *	6	0.00	0.000
13)	Internet Use *	8	2.00	0.500
7)	Sales > $140,000	24	0.96	0.042
14)	Sales < $ 1,605,130 *	19	0.00	0.000
15)	Sales > $ 1,605,130 *	5	0.80	0.200

Source: Ornamental Horticulture Producer Survey

The text above each split refers to the condition for the left child, or node. Although the condition for the right child is not shown, it can be inferred as the negation of the left child. In addition, the number at the leaves is the number of observations included at each node. The results for the regression tree are presented in the table below.

The second split occurred with the 'sales' variable, where observations with sales less than $140,000 were classified to the left child. Again, a third split was observed using the 'internet' variable. Of the eight observations having sales under $140,000, and using the internet, four reported barcode sticker specifications in the terms of contract. The right child of the second split had 24 observations, which again were split by 'sales', with a cut-point of $ 1,605,513. The right child had five observations with one of those having reported the inclusion of barcode stickers in the terms of contract.

4.4.20. Regression Tree for Custom Containers, Garden Centers

The root included 76 observations, of which only 9.20 % corresponded to inclusions. An asterisk by the name of the variable indicates a terminal node. The variable that minimized the sum of squares of the response was 'sales'. The cut-point for 'sales' is $39,500. The left child of this split had ten observations, which were divided by the variable 'year'. A total of five observations were categorized to terminal node 4), with two inclusions, and five observations categorized to terminal node 5), with one inclusion (Table 4.48). On the other hand, the right child of the first split was divided by 'big four buyers' with a cut point of 25.5 %, and 38 observations. Terminal node 7) had no inclusions. The left child of the 'big four buyers' split was split again by 'legal organization', where 14 corporations ended in terminal node 13) with no inclusions. Non-corporations were split by 'sales' again, with a cut-point of $140,000. The left child of this split included eight observations and no inclusions for firms with less than $140,000 in sales, and the right child contained four inclusions for firms with sales over $140,000.

Table 4.48 - Regression Tree for Custom Containers, Garden Centers

Node	Split	N	Deviance	Yval
1)	Root	76	6.36	0.092
2)	Sales < $ 39,500	10	2.10	0.300
4)	Year 1996 *	5	1.20	0.400
5)	Year 2001 *	5	0.80	0.200
3)	Sales > $ 39,500	66	3.76	0.061
6)	Big Four Buyers < 25.5	28	3.43	0.143
12)	Non-Corporations	14	2.86	0.286
24)	Sales < $ 140,000 *	8	0.00	0.000
25)	Sales > $ 140,000 *	6	1.33	0.667
13)	Corporations *	14	0.00	0.000
7)	Big Four Buyers > 25.5*	38	0.00	0.000

Source: Ornamental Horticulture Producer Survey

4.4.21. Regression Tree for Returnable Shipping Equipment, Mass-Merchandisers

The root included 76 observations, of which only 11.80 % corresponded to inclusions. An asterisk by the name of the variable indicates a terminal node (Table 4.49).

Table 4.49 - Regression Tree for Returnable Shipping Equipment, Mass-Merchandisers

Node	Split	N	Deviance	Yval
1)	Root	76	7.93	0.118
2)	Sales < $ 1,805,130	68	4.63	0.074
4)	Sales < $ 275,000	38	4.34	0.132
8)	Big Four Buyers < 55	18	3.61	0.278
16)	No Internet Use *	10	0.00	0.000
17)	Internet Use *	8	1.88	0.625
9)	Big Four Buyers > 55 *	20	0.00	0.000
5)	Sales > $ 275,000 *	30	0.00	0.000
3)	Sales > $ 1,805,130 *	8	2.00	0.500

Source: Ornamental Horticulture Producer Survey

The variable that minimized the sum of squares of the response was ‘sales’. The cut-point for ‘sales’ was $1,805,130. The right child of this split had eight observations, and was a terminal node which included four inclusions. The left child had 68 observations, which were split again by the variable ‘sales’. The cut-point this time was $275,000, and the right child was a terminal node with 30 observations and no inclusions. The left child of node 4) was split by ‘big four buyers’, where 20 observations with more than 55 % were categorized into the right child, terminal node 9), which contained no inclusions. Firms with ‘big four buyers’ lower than 55 % were categorized into the left child, which was split one last time by the variable ‘internet’. The left child, terminal node 16), included 10 observations and no inclusions, while the right child, firms using the internet in day-to-day operations, included eight observations with five of those being inclusions.

4.4.22. Regression Tree for Returnable Shipping Equipment, Garden Centers

The root included 76 observations, of which only 10.53 % corresponded to inclusions. An asterisk by the name of the variable indicates a terminal node. The variable that minimized the sum of squares of the response was 'debt'. The right child of the first split included 48 observations, all of which indicated some degree of debt. This right child was split once more by 'big four buyers' to form two terminal nodes. The cut-point for 'big four buyers' was 19 %. Forty observations with values higher than the cut-point were classified into terminal node 7), which had no inclusions. The left child of the 'big four buyers' split, terminal node 6), had two inclusions, and a total of eight observations (Table 4.50)

Table 4.50 - Regression Tree for Returnable Shipping Equipment, Garden Centers

Node	Split	N	Deviance	Yval
1)	Root	76	7.15	0.105
2)	No Debt	28	4.71	0.214
4)	No Internet Use *	14	0.00	0.000
5)	Internet Use	14	3.43	0.429
10)	Big Four Buyers < 55 *	8	1.50	0.750
11)	Big Four Buyers > 55 *	6	0.00	0.000
3)	Debt	48	1.92	0.042
6)	Big Four Buyers < 19 *	8	1.50	0.250
7)	Big Four Buyers > 19 *	40	0.00	0.000

Source: Ornamental Horticulture Producer Survey

The left child of the first split consisted of observations that had indicated no debt. The second split for the left child of debt was based on the variable 'internet'. Terminal node 4) includes observations with no debt, and with no internet use, with a total of 14 observations and no inclusions. The right child of the 'internet' split was node 5), which was split one last time by 'big four buyers', with a cut-point of 55 %. The left child, terminal node 10) had eight observations and six inclusions. Those six inclusions exhibited no debt, used the internet in day-to-day operations, and all had 'big four buyers' of less than 55 %. On the other hand, the right

child of the ‘big four buyers’ split included six observations with no inclusions and was labeled terminal node 11).

4.4.23. Regression Tree for Take-back Unsold Merchandise, Garden Centers

The root included 76 observations, of which only 10.53 % corresponded to inclusions. An asterisk by the name of the variable indicates a terminal node. The graphical representation of the regression tree can be seen in Appendix B. The variable that minimized the sum of squares of the response was ‘big four buyers’, with a cut-point of 25.5 %. The right child was a terminal node corresponding to observations with more than 25.5 % in sales going to the biggest four buyers. This terminal node, named 3), included 48 observations with no inclusions. The left child of the first split, node 2), was split again by ‘outsales’ with a cut-point of 2.5 %. The right child of the ‘outsales’ split contained 18 observations with more than 2.5 % high sales involvement and had no inclusions. On the other hand, the left child contained four inclusions out of 10 observations. The last split occurred by ‘year’, but it was expected because the same two firms indicated having included take-back policies for 1996 and 2001, and it doesn’t offer much information (Table 4.51).

Table 4.51 - Regression Tree for Take-Back Unsold Merchandise, Garden Centers

Node	Split	N	Deviance	Yval
1)	root	76	3.79	0.053
2)	Big Four Buyers < 25.5	28	3.43	0.143
4)	Outsales < 2.5	10	2.40	0.400
8)	Year 1996 *	5	1.20	0.400
9)	Year 2001 *	5	1.20	0.400
5)	Outsales > 2.5 *	18	0.00	0.000
3)	Big Four Buyers > 25.5*	48	0	0

Source: Ornamental Horticulture Producer Survey

Chapter 5. Summary and Conclusions

5.1. Summary

Researchers and scholars are concerned that highly consolidated or highly integrated industries threaten the economic viability of the independent producer or independent processor (Lawrence et al., 1997). This concern stems from the argument that vertical integration may lead to market foreclosure, a situation in which independent producers no longer have open markets through which to sell their products (Salinger, 1988). The evolution of agriculture towards "industrialization" presents a problem for policymakers, who must weight the benefits of "industrialization" against its drawbacks.

The main objective of this study is to investigate the extent of change in the relationship between nursery growers and buyers with respect to changes in the conditions of sale (agreement to sell) other than price and quantity. Special emphasis was placed on selected business and general characteristics of firms to see if these characteristics affected contracting practices. The study should be beneficial for growers in Louisiana because it highlights predominant arrangements within the industry, so producers can observe how other firms are organizing their relationships. The study will identify contracting practices according to selected marketing channel usage.

In the nursery industry business, agreements are commonly verbal rather than written contracts, while in some industries transactions occur under written contracts. In addition, contracts in this industry are flexible, mitigating risk on both sides of the trade. In the past, the agreement included price, a specified quantity, and some growers used the offer of delivery within some specified distance as a way to differentiate themselves from other sellers. In this study, we are interested in relatively recent additions to these standard terms of the contract.

Because of the rapid pace of change in the nursery industry there is a need for up-to-date, accurate and high quality information for stakeholders within the industry. The major sources of information for producers are trade shows, journals, fellow growers and the market itself. This study gives growers an updated set of industry averages and benchmarks with regard to the contents of sale agreements, and can assist the decision-maker in each firm to identify the current trends within the industry. In addition, the results make available more information about adoption of technology such as supply chain management and electronic purchasing. The Louisiana nursery industry has experienced significant change over the last fifteen years, and it is very likely that it will continue to evolve. Particularly, changes in retailing practices, as well as new strategies pursued by retailers, fuel changes in the nursery industry as a whole.

A literature search suggested that little work had been done to study contracting practices within the nursery industry. From the scientific and academic standpoints, it is very important to document the ongoing processes in the nursery/grower industry in Louisiana. According to the Economic Research Service of the USDA, the nursery and greenhouse industry comprises the fastest growing segment of U.S. agriculture, which again suggests that there is a continuous need for updated and accurate information on the industry. Additionally, policymakers need a clearer picture of the current situation and outlook for the green industry in Louisiana, to make better informed decisions concerning society's welfare.

5.1.1. Changes in Individual Requirements for the Mass-Merchandiser Marketing Channel

A McNemar's test of proportions was conducted for each of the items hypothesized to be included in the terms of exchange between nursery growers and mass-merchandisers to test for significant differences between the years 1996 and 2001. The test of proportions indicated significance for five specific items in the grower / mass-merchandiser terms of exchange;

barcode sticker specifications, custom container specifications, returnable shipping equipment specifications, take-back unsold merchandise, and continuous inventory replenishment.

According to literature, mass-merchandisers are gaining market share at the expense of alternative marketing channels (Hampton, 2001). The test of proportion for barcode sticker specifications yielded significant differences, as was expected. Increasingly, the task of including barcode stickers falls to the grower, as he/she provides an additional service to the buyer. Also, mass-merchandisers already have systems in place that allow for real-time monitoring of inventory levels and at the same time facilitate control of the reordering process. Having barcode stickers is the current technology for real-time inventory control. As mass-merchandisers gained market share in the ornamental plants category, they increasingly have sourced products from growers who are willing to provide services. One of these was the condition that growers place barcode stickers on their products. Only eleven growers had accepted this item in the terms of contract in 1996, but the number had increased to twenty in 2001.

The test of proportions for custom container specifications also yielded significant results. Mass merchandisers were expected to request more packaging conditions in a contract than would independent garden centers, because their market position enables them to bargain for this type of service. It was also hypothesized that mass-merchandisers are more likely to request custom containers because they decorate their retail facilities for seasonal promotion. The number of growers reporting having such item in the terms of contract grew from four in 1996 to 13 in 2001.

Testing differences in proportion for the returnable shipping equipment item also yielded significant results. More growers reported that this item was included in the terms of contract with mass-merchandisers in 2001 rather than 1996. Mass-merchandisers request this type of

arrangement because their retail operations have a high degree of complexity and product assortment. This equipment facilitates product handling, allowing retailers to allocate fewer resources to the arrangement of these products at the retail level. When the product arrives to the retail facility, the "shipping carts" filled with products are unloaded, moved into the store, and the empty "shipping carts" are returned to the grower. This type of equipment involves additional costs to the grower, and the buyer might impose this condition onto the grower as a requirement to do business with them. A buyer can only impose such conditions if he/she has comparatively more market power than the seller.

The item 'take-back of unsold merchandise' was a significantly higher proportion, as the number of growers reporting this type of arrangement doubled from 1996 to 2001. Six growers reported having this item in the terms of contract in 1996, versus twelve in the year 2001. As mass-merchandisers exert their increasing market power and impose such conditions onto growers, it is the growers who bear the cost of 'unsold merchandise', not the retailers. If the retailers can include 'take-back' specifications in the agreement, their ability to offer lower prices than alternative marketing channels is enhanced because the cost of unsold merchandise is transferred.

Continuous inventory replenishment arrangements were a significantly a higher proportion in 2001 compared to 1996. *A priori* reasoning indicated that this would also be one of the key items with which growers had to comply with in order to conduct business with mass-merchandisers. In 1996, eight growers had such provisions in the terms of contract, and the number increased to 13 in 2001. As more growers do business with mass-merchandisers, it was expected that significant changes would occur from 1996 to the year 2001 for this marketing channel.

5.1.2. Changes in Individual Requirements for the Garden Center Marketing Channel

A McNemar's test of proportions was conducted for each of the items hypothesized to be included in the sales agreement between nursery growers and garden centers, to test for significant differences between the years 1996 and 2001. Generally, it was expected that there would be fewer significantly different items. The tests of proportion indicated significance for four items in the grower-garden center terms of exchange; 'product information tags', 'barcode sticker', 'minimum volume', and 'continuous inventory replenishment' specifications.

The test of proportion for 'product information tag' specifications yielded significant differences. The null hypothesis stated there were no significant differences for this item in the garden center market channel. The reason for this is that product information tags, in many cases, not only convey information about the product being sold, but also provide a space where the barcode sticker can be attached to comply with buyers' requests. Since many smaller garden centers may not use barcode scanning at checkout, the need for the space provided by the product information tags was not thought to be of critical importance. In addition, garden centers might provide a more personalized attention to customers, so the need for the information provided in product information tags was hypothesized to be less important for garden centers. However, the McNemar's test conducted for this item proves the contrary. In 2001, 23 growers reported having this type of arrangement in the terms of contract for garden centers versus 22 growers in the mass-merchandisers market channel. Because product information tags provide the customer with general information that is useful and important to the final customer, product information tags were the most frequent item found in the terms of contract.

The test of proportion for barcode sticker specification in the garden center marketing channel also yielded significant results, contrary to what was expected. No growers in the sample

reported this item in the terms of contract in 1996, and five growers reported the inclusion of this item in 2001. While these are low proportions, garden centers are adopting this type of technology to improve their business practices. Although the adoption of this technology is not believed to be widespread in the garden center market channel, the information conveyed by the analysis might indicate the start of a trend for this particular market channel. As time progresses, more garden centers are likely to adopt barcode scanning technology.

Minimum volume specifications also were found to be significantly different between 1996 and 2001, as expected. In 1996, 10 growers reported having this item in the sales terms, versus 14 growers in 2001. Minimum volume specifications were hypothesized to be the most likely ordering technique by garden centers over continuous inventory replenishment arrangements, mainly because they were not expected to have the technological capabilities to implement this technology.

The significant McNemar's test of proportions for the continuous inventory replenishment item in the garden center channel proved a surprise. Garden centers were not expected to have this type of system in place, so it was surprising to find four growers had this type of arrangement in 1996. Furthermore, the number of growers that reported this item in the terms of contract doubled by 2001. As stated before, growers were expected to have more minimum volume arrangements than continuous inventory replenishment arrangements, as was the case. However, as time progresses and more garden centers adopt technology enabling them to enter into continuous inventory replenishment arrangements, more growers are going to be required to have their own systems in place to conduct business in this manner. It is not clear if the responses by growers meant that garden centers had already implemented electronic

continuous inventory replenishment systems, or if they referred to garden centers as continually placing orders.

The non-significance of items such as custom containers, returnable shipping equipment, as well as take-back unsold merchandise was expected. The reason for this is that garden centers don't have the same market power as mass-merchandisers, therefore, it is much more difficult for them to impose such conditions onto the grower, especially taking into account that compliance with each one of those items mentioned has cost implications. To put it bluntly, custom containers, returnable shipping equipment cost, and take-back policies cost money, and are likely to be more strongly resisted by growers.

5.1.3. Changes in Overall Requirements for the Mass-Merchandiser Marketing Channel

A McNemar's test of proportions was conducted to evaluate if the proportions of all items in the sales terms between growers and mass-merchandisers had changed between 1996 and 2001. The null hypothesis that there were no changes in the proportion of all items included in the terms of contract was rejected. Considering all items at the same time, there was an increase in the number of items included in the terms of contract in 2001 relative to 1996.

5.1.4. Changes in Overall Requirements for the Garden Center Marketing Channel

A McNemar's test of proportions was conducted to evaluate if the proportions of all items in the sales terms between growers and garden centers had changed between 1996 and 2001. The null hypothesis that there were no changes in the proportion of all items included in the terms of contract was rejected. Considering all items at the same time, there was an increase in the number of items included in the terms of contract in 2001 relative to 1996.

5.1.5. Logistic Regression Models for the Mass-Merchandiser Marketing Channel

Of the nine models for mass-merchandisers, 6 were significant; product information tags, barcode stickers, transportation to retailer, on-time delivery, take-back unsold merchandise, and minimum volume models. The custom containers, returnable shipping equipment, and continuous inventory replenishment models were not found to be significant.

Of the 6 models that were significant, the variable 'Internet' is significant in all except 'product information tags'. This variable is included in the models as a proxy for technology in the production/marketing process. In all significant cases, the lack of Internet at a firm resulted in lower odds of inclusion than firms having reported Internet use in their day-to-day operations. An inclusion is defined as an item that was accepted by the grower in the sales agreement.

The variable 'debt' was significant at an alpha level of 0.05 in 3 of the 6 significant models. It was hypothesized that producers may feel a higher need for demand assurance and higher need for careful planning if the firm had debt. If this hypothesis were true, they would be more likely to accept any of the given items in the terms of contract. Contrary to what was expected, there was a positive relationship between growers who didn't report debt and the inclusion of items in the terms of contract. However, when a grower complies with the buyer's requests it means he/she incurs higher costs, and consequently, faces higher risks. In order for a firm to accept the items imposed by the buyer, it must have adequate margins to cover additional costs. Absence of principal and interest obligations might provide an adequate margin. By this logic, the positive sign between firms with no debt and the inclusion of a given item in the terms of contract might be explained. Firms having no debt were found to be more likely to accept any item in the terms of contract for the above-mentioned models.

The variable ‘big four buyers’ was significant for the product information tag model, for the take-back unsold merchandise model, and for the barcode sticker model. The percentage of sales going to the biggest four buyers was hypothesized to have a positive correlation with the inclusion of any given item in the terms of contracting. However, this relationship was negative. In the significant models, as the percentage of sales going to the biggest four buyers increased, the odds of including any given item in the terms of contracting decreased. Growers with a low percentage of total sales going to their biggest four buyers may have a broader, more diversified customer base, allowing them to be able to accept the items imposed by some buyers without the risk exposure faced by firms with high percentage of sales going to the biggest four buyers.

The results for the control variable year were consistent with the McNemar’s tests conducted during the first part of the study. This variable was significant at the 0.05 level for the following models; barcode sticker, custom containers, and returnable shipping equipment. On the other hand, the variable year was significant at an alpha level of 0.10 for ‘take-back unsold merchandise’ and ‘continuous inventory replenishment’ models. These results are also consistent with the McNemar’s tests.

The variable ‘outsales’ was expected to have a positive relationship to the inclusion of items in the terms of exchange. In both cases where the variable was significant, the ‘transportation to retailer’, and the ‘minimum volume’ models, this relationship was positive.

‘Sales’ was significant in the ‘take-back unsold merchandise’ model, and the relationship was positive. This variable was also significant in the ‘returnable shipping equipment’ and ‘custom container’ models, but neither model was significant. An increase in the sales level was hypothesized to increase the marketing risk for a firm, and the sign exhibited by the variable ‘sales’ in the different models is compatible with this notion. The reason to consider sales as a

proxy for marketing risk instead of as a market power measure is that no nursery grower has enough sales to be able to negotiate at an equal level with mass-merchandisers.

5.1.6. Logistic Regression Models for the Garden Center Marketing Channel

Of the nine models for garden centers, 4 were significant; 'product information tags', 'transportation to retailer', 'on-time delivery', and 'minimum volume' models.

Of the 4 models that turned out to be significant, the variable 'Internet' was significant in all except 'product information tags'. This result was consistent with the mass-merchandiser model for 'product information tags', which was the only significant model for which this variable was non-significant. In all cases, the lack of Internet at a firm resulted in a lower odds of inclusion relative to firms having Internet access.

The results for the control variable 'year' were consistent with the McNemar's tests results. This variable was significant for the 'product information tag', 'minimum volume', and 'continuous inventory replenishment' models.

The variable 'debt' was significant in the 'transportation to retailer' model and in the 'minimum volume' model. These results are also similar to the mass-merchandiser models. One plausible explanation for this is that growers incur higher costs when accepting any given item, and consequently, they face a higher risk. In order for a firm to accept the items imposed by the buyer, it must have adequate margins to cover additional costs. Absence of principal and interest obligations might provide an adequate margin. By this logic, the positive sign between firms with no debt and the inclusion of a given item in the terms of contract can be explained. Firms having no debt were found to be more likely to accept any item in the terms of contract for the above-mentioned models.

‘Outsales’ was significant in the ‘transportation to retailer’ and in the ‘minimum volume models’. The relationship was positive.

‘Big four buyers’ was significant in the ‘product information tag’ model only. The sign was negative. As the percentage of sales to the biggest four buyers increases, the odds of including any given item in the terms of a contract decreases. One plausible explanation for this negative relationship, as stated before, is that growers with a diverse customer base are more likely to accept any of the given items in the terms of contracting because the risk exposure level does not increase significantly.

‘Legal organization’ was significant in the ‘transportation to retailer’ model, and the relationship turned out to be what was expected. The odds of inclusion were lower for non-corporations versus corporations in the transportation to retailer model.

Finally, ‘sales’ was only significant in the ‘transportation to retailer’ model. In contrast to the positive sign exhibited in the mass-merchandiser models, the relationship turned out to be negative.

5.1.7. Recursive Partitioning Algorithm Models

The RPA methodology was implemented to identify variables that had the most impact when the model’s objective is to minimize variance of the dependent variable. This method was used when the logistic regression procedure failed. Results were consistent with what was expected. Examining all regression trees for the garden center market channel, the majority of variables that were important in generating the “splits” were, in general, variables that were significant in some of the logistic regression models. Splits at the start of the regression tree should carry more weight than splits towards the bottom of the regression tree because no other

variable in the dataset reduced the sum of squares by a greater factor than the variable responsible for the first split.

The first split in the 'barcode sticker' model for garden centers occurred with the variable 'year'. This result was consistent with the McNemar's test conducted in the first objective. All inclusions were classified to the right child of this regression tree, so the variable 'year' classified all inclusions to one side. The next split, however, divides inclusions into the resulting two nodes, so the importance of this split is somewhat undermined. Results are more meaningful, or more important, when all inclusions are in the same node after the first split, and the same rationale can be used for subsequent splits. The greater the similarities between characteristics of firms that indicated inclusions, the more likely that splits are going to result in all inclusions going to the same node. The opposite is also true. In a large sample sizes, interpretation of meaningfulness would depend on the percentage of inclusions "flowing" through each node, even if the first split does not group all inclusions on the same node, or side. However, in this study, a small sample size is used, so greater weight is going to be placed on splits that group inclusions on the same side, or node.

The 'take-back unsold merchandise' model isolated inclusions to the left child of the first split. The variable responsible for the first split was 'biggest four buyers'. The second split was conducted on the basis of 'outsales', and also resulted in all inclusions going to just one node. However, it is important to note that this may happen because of the small number of inclusions reported by growers.

For the 'custom container' for garden centers, the first split is not as meaningful as in the 'barcode sticker' model for garden centers, because not all inclusions are grouped into the same node. The variable chosen for the first split was 'sales'. Three inclusions go to the left child,

while four inclusions were destined to the right child. A similar case can be seen in the 'returnable shipping equipment' model for garden centers. Two inclusions were destined to the right child, and the six remaining inclusions went to the left child. In this model, the first split was based on the variable 'debt'.

The regression tree for mass-merchandisers yielded three variables being used to split the data. The first split occurs with the variable 'sales'. This split cannot be considered very meaningful, because four inclusions go to the right node, and five inclusions go to the left node.

In general, results from the regression trees were similar to logistic regression results, because variables responsible for splits in these models were significant in some of the logistic regression models. RPA methodology was considered a good alternative to identify important variables in models for which the GEE algorithm didn't converge, and RPA models provided some insight to be able to recognize important factors in identifying inclusions.

5.2. Conclusion

There is sufficient evidence to suggest that, over time, growers are required to accept more items in the terms of contract. The study covered a period between 1996 and 2001, but the trend observed is likely to continue.

The test of proportions for the garden center market channel yielded four significant models, which are: 'product information tags', 'barcode sticker', 'minimum volume', and 'continuous inventory replenishment'. Except the 'minimum volume' test, changes occur on items that were much more frequently reported in the mass-merchandiser market channel in 1996 and 2001 rather than the garden center market channel. As expected, garden centers may be adopting practices that have already been adopted by mass-merchandisers.

It is important to note that the four test of proportions that yielded significant results for the mass-merchandisers market channel are 'barcode sticker', 'custom containers', 'returnable shipping equipment', and 'take-back unsold merchandise'. The only instance where an item was significant for both market channels was in the case of 'barcode stickers'. Very few growers reported having included any of the other three items that were significant for the mass-merchandiser market channel. Only five growers reported 'barcode sticker' specifications in 2001 for garden centers, versus 20 growers in the mass-merchandiser channel. The other three items that are significant in the mass-merchandiser channel, 'custom containers', 'returnable shipping equipment', and 'take-back unsold merchandise', exhibit very few occurrences in the garden center channel. The reason why changes in proportion are significant for the mass-merchandiser channel is that the above named items are relatively new practices in the industry, and garden centers have yet to adopt them, which explains the low frequencies in the garden center channel. These results reinforce the notion that mass-merchandisers are the leaders in the industry, and alternative market channels mimic practices that evolve from the mass-merchandiser-grower relationship. What remains to be seen is if garden centers have the market power to request 'custom containers', 'returnable shipping equipment', and 'take-back unsold merchandise' provisions in the terms of contracting.

Several characteristics of nursery firms have been found to be important factors in explaining items included in the terms of contract. The use of internet is one of the most important factors amongst the variables included in the models for garden centers and for mass-merchandisers. In all instances, the lack of Internet at a firm resulted in a lower odds of inclusion relative to firms having Internet access.

'Debt' also played an important role in explaining items included in the terms of contract. Firms having no debt were more likely to accept items in the agreement than firms that had some debt for both market channels.

In the mass-merchandiser models, 'big four buyers' was important in determining if a given item was in the terms of contract. This relationship turned out to be negative, meaning that as the percentage of sales going to the biggest four buyers increases, the odds of inclusion decrease.

5.3. Implications

It is very likely that the trend observed in the study will continue and more items are going to be included in the terms of contract as time goes by. Nursery firms don't have the market power necessary to resist these items imposed by the buyers, so they comply with buyers' requests in an effort to reap the benefits of a win-win partnership and grow with the retailer. However, the notion of a win-win partnership is somewhat obscured by the lack of protection the nursery farms have to live with. If a buyer "booked", or contracted, a certain product, and later decide they don't want that product anymore, there is little legal action that can be taken by the grower to ensure that the agreement is honored. The difference between "bookings" and contracts is that one is just a verbal agreement while the other may be legally binding. It is not known for certain how growers interpreted "contracting" in the questionnaire, but there's evidence to suggest that both terms might have the same meaning to them. Costs are higher for those growers complying with the buyers' requests, because the services they need to provide have monetary implications, if not directly, then indirectly. The cost is transferred from the buyer to the seller, and as more of these costs are shifted to the nursery firms, nurseries will have to grow in an effort to take advantage of economies of scale, a consolidation process seen in other

industries such as the swine or poultry industry. Small farms will not be able to compete with larger nurseries, and some might disappear or be absorbed by larger companies.

Furthermore, technological innovations are already playing a critical role in the way both buyers and sellers do business. Mass-merchandisers are implementing 'barcode sticker' and 'continuous inventory replenishment' specifications, both of which are not as commonly observed in the garden center channel. However, this is likely to change, as garden centers adopt scanning as well as continuous inventory replenishment technologies that would enable them to become more competitive. Consequently, as garden centers adopt technological advances, growers will also have to comply with their requests. This would not affect those producers that are familiar with this technology, either because they are already conducting business in this manner, or because they have done so in the past. From the perspective of growers, there was a clear linkage between internet use and having any given item in the terms of contracting; those buyers having indicated internet use are more likely to include items in the terms of contract, and vice-versa.

5.4. Suggestions for Further Research

This study involved nursery growers in the state of Louisiana, but a more accurate picture of contracting practices in the nursery industry could be portrayed in a similar study involving nurseries from all states in the U.S. Also, a larger dataset would allow for more robust statistical models.

This study's focus was on the grower's point-of-view. It is clear from the discussion, however, that many of the results reported here are not unconstrained grower choices. The changing retail structure suggests that grower may accept sales agreements that add to their costs

and risk because they have fewer opportunities. Future research in contracting practices in the nursery industry could be modeled to include information on both, the buyer and the seller.

Also, no performance measures, such as growth or efficiency measures, were included in this analysis. Business practices of the different nursery firms are known, but no measure of how well they are doing is included. Ultimately, it would be very informative to understand what factors shape the success or failure of a given company, in terms of growth, profit, and/or other measures.

There is no evaluation of the potential strategies that might be adopted by growers and garden center retailers to offset the mass-merchandisers' dominant position in the market. Growers are surely interested in the viability of the garden center market channel as a competitive alternative to the mass-merchandisers, and may act in ways that favor garden centers. Information of that nature was not readily available to be included in the analysis or discussion, but should be considered for research.

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Appendix: Ornamental Horticulture Producer Survey

This information is critical to our process for estimating the total dollar impact of the 'green' industry (ornamental horticulture and turfgrass) in Louisiana. Information you provide will be confidential. No individual's sales, revenues or expenditures information will be identifiable.

Your informed estimates of these numbers will be sufficient. It is not necessary to spend time digging through records.

I. ORGANIZATION AND SALES

1. Please indicate the acreage or square feet you devote to the following *nursery production* activities
   _____ field production of ornamental products
   _____ container production of ornamental products
   _____ greenhouse production: flowers, foliage, bedding plants, etc.
   _____ sod production
   _____ production of intermediate products such as liners
   _____ other, please describe:

If your firm is not involved in the activities above, or is a small grower/ retailer (less than $5,000 in annual sales), please stop here, indicate that your firm is not involved in these activities, and return the questionnaire.

2. Year established: _____ Year established in Louisiana, if different _____

   Are you headquartered in Louisiana? ____yes _____ no

3. How many locations does the firm have? (count each address as one location, even if there are several different kinds of activity there)
   one ____ two ____ if more, write in number _____ number in Louisiana _____

4. What is your firm's legal structure?
   _____ proprietorship _____ corporation _____ partnership _____ other

5. Indicate the level of education you have completed.
   ____ high school
   ____ four year Bachelor's degree
   ____ advanced degree
6. What was the level of gross sales from your Louisiana facilities in 2001, to the nearest $5,000?
   $_____

   - what proportion was sold to retail _____ % and wholesale _____ % customers?
   - what proportion was sold to buyers in
     _____ % Louisiana _____ % all other states and foreign countries?
   - what was your growth rate for total sales from 1996 to 2001? _____ %

7. How diverse is (was) your customer base?

	1996	2001
number of buyers	_____	_____
percent of sales going to your 4 biggest buyers	_____	_____

II. EXPENSES: In this section, questions relate to last year's (2001) expenses, in the categories of *general overhead* and of *direct costs* for ornamental plant production. Please provide your best informed estimates of costs in these categories. Your response can be either in dollars or as a percentage of sales. In the right-most column, please indicate the portion of expenditures that came from suppliers in Louisiana.

8. Overhead Expenses (annual costs, such as report the column that is most convenient for you, no need to do	**dollars** or	**% of sales**	**% purchased in La.**
facilities			
ownership/leasing expenses (i.e., mortgages, rent) for land and buildings	$_____	_____%	
maintenance and repair (no wages/salaries	$_____	_____%	
remodeling, additions, and/or construction	$_____	_____%	
equipment			
purchases	$_____	_____%	_____%
leases	$_____	_____%	_____%
repair	$_____	_____%	_____%
fuel	$_____	_____%	
utility and other expenses			
water (inc. irrigation), sewer, electricity, gas,	$_____	_____%	
telephone and other communications	$_____	_____%	
taxes (income, corporate, property, etc)	$_____	_____%	
all other overhead expenditures	$_____	_____%	

9. Direct Crop Expenses

all plant material	$_____	_____%	_____%
chemicals, fertilizers	$_____	_____%	_____%
soil, soil conditioners, bark and mulch	$_____	_____%	_____%
wages, salaries and benefits	$_____	_____%	
other crop expenses	$_____	_____%	

10. What proportion of the following expenses was purchased from wholesalers?

item	% purchased from wholesalers
equipment	_____%
chemicals, fertilizers	_____%
soil, soil conditioners, bark and mulch	_____%

11. Please give your 'best guess' estimate of planned expenditures on major construction or equipment purchases for the year 2002?

$ _____ equipment $ _____ construction

12. We are interested in the way the value of nursery industry assets differs depending on whether the buyer is within or outside the industry. What is your estimate of the selling price of your nursery operation if you were to sell to:

another nurseryman $ _____

someone who intends to use the assets for purposes other than nursery production $_____

13. Regarding your tendency to take risks, how would you characterize yourself relative to other nurserymen? (please check one answer)

____ I tend to take on substantial levels of risk in my investment decisions.

____ I tend to avoid risk when possible in my investment decisions.

____ I neither seek nor avoid risk in my investment decisions.

14. What is your debt/asset ratio? This is your total debt divided by your total assets, multiplied by 100 to yield a percentage.

_____ % debt/asset ratio

III. MARKETING

15. To what kind of customers do you make wholesale sales? Please report the proportions going to each of these kinds of customers.

kind of customer	**percent in 2001**
retailers - mass merchandisers/home centers	_____%
retailers - garden centers	_____%
retailers - all others (grocery, hardware, etc)	_____%
landscape firms	_____%
re-wholesalers	_____%

16. Of your wholesale sales in 2001, in what percentage did you have to make concessions (in terms of price or other factors) to get the sale completed?

_____%

17. Of your wholesale sales, please indicate the percentage that was *contract production* for the years 1996 and 2001. We define contracting as a situation where you produce a product for a specific buyer. This does not include the situation where you make production decisions and orders are later "booked" ahead of purchase. Please keep in mind that a contract may be verbal or written.

percent in 1996	**kind of customer**	**percent in 2001**
_____ %	retailers - mass merchandisers/home centers	_____ %
_____ %	retailers - garden centers	_____ %
_____ %	retailers - all others (grocery, hardware, etc)	_____ %
_____ %	landscape firms	_____ %
_____ %	re-wholesalers	_____ %

Please respond to questions 18, 19, an 20 even if you do not produce under contract.

Here, we ask how your relationship with customers, particularly large ones, has changed over the period 1996 to 2001. We are interested in the differences between your mass merchandiser customers and your traditional garden center customers. Overall, mass merchandisers' market share has increased, while the traditional garden center's share declined. The table below contains a list of terms often found in business contracts. If you contract, please check the items that were (are) included in the terms of your contracts. If you do not contract, please respond on the basis of your perception of items you believe were (are) included in the terms of contracts.

18. Are (were) these items in the contract (check if yes)?

item	**mass merchandisers/ home centers**		**garden centers**	
	1996	2001	1996	2001
product information tags	____	____	____	____
barcode sticker	____	____	____	____
custom containers	____	____	____	____
transportation to retailer	____	____	____	____
returnable shipping equipment (carts, etc.)	____	____	____	____
on-time delivery	____	____	____	____
take back unsold product	____	____	____	____
minimum volume	____	____	____	____
continuous inventory replenishment	____	____	____	____

19. In general, does a contract provide that you will be paid more for performing any of the activities in the table below?

	mass merchandisers/ home centers		**garden centers**	
	Yes	No	Yes	No
product information tags	_____	_____	____	_____
barcode sticker	_____	_____	____	_____
custom containers	_____	_____	____	_____
transportation to customer	_____	_____	____	_____
returnable shipping equipment	_____	_____	____	_____
unloading product	_____	_____	____	_____
take back unsold merchandise	_____	_____	____	_____

20.Please rate the following factors associated with contracting. Use a 1 to 5 scale, with 1 = very unimportant and 5 = very important.

item	**rating**
reduced price risk	____
assured market or sale	____
improve access to capital	____
reduced choice in production and/or marketing decisions	____
less costly to make a sale (in terms of time and money)	____

21. How do you use the Internet? (Check all that apply.)

I don't use the Internet	_____
business-to-business buying/selling (B2B)	_____
e-mail	_____
promotion (web page, video conference, etc.)	_____

22. Of your wholesale sales, what percentage was made in the following ways in 2001?

trade shows	_____%
sales people in assigned geographic or other territories	_____%
sales people in main office (telephone, fax, etc)	_____%
electronic business-to-business selling (B2B)	_____%
mail order	_____%
drop-in customers	_____%
Total	**100 %**

23. Specifically, how does increasing retail consolidation affect you? Check an answer for each one of the items below.

	lower	**the same**	**higher**
price received for my product is	____	____	____
my volume of sales is	____	____	____
my ability to negotiate is	____	____	____
my costs are	____	____	____

IV. WORKFORCE

24. Please indicate the amount of employee and family labor used in your Louisiana operations in 2001.

type of employee	**number**	**average number of weeks worked**	**average number of hours per week**
seasonal full time	_____	_____	_____
seasonal part time	_____		_____
full year part time	_____		_____
full time employees	_____		
hired managers	_____		
owners (involved in day-to-day)	_____		
unpaid owner and family labor	_____	_____	_____

THANK YOU FOR YOUR COOPERATION!

Vita

Roberto E. Navajas graduate from Louisiana State University in 2000 with a Bachelor of Science degree in agricultural business. In January 2001 he enrolled in Louisiana State University to pursue a Master of Science degree in agricultural economics. He will receive the degree of Master of Science in May, 2003