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Farm Operator Satisfaction with Retail Pesticide Suppliers in the Arkansas Delta

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WITH RETAIL PESTICIDE SUPPLIERS
IN THE ARKANSAS DELTA



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Frank L. Farmer, and Daniel M. Settlege

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PESTICIDE SUPPLIERS IN THE ARKANSAS DELTA**

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SUMMARY

Two hundred ninety farm operators in the three easternmost crop reporting districts in Arkansas responded to a mail survey in November 1996 about their preferences and satisfaction with retail pesticide suppliers. Results show most farmers are quite satisfied with their main retail pesticide supplier, although 55.5% of the farm operators used more than one retail pesticide supplier in 1996. Users of multiple suppliers were less satisfied with their suppliers than those using only one supplier. Availability of certain pesticides was the most frequently mentioned reason for using multiple suppliers. Several attributes were important in selecting the main supplier with reputation being the most important, followed by delivery services, long-term relationship with salesperson, and price. Although not rated highly by the farm operators, location was also an important consideration in choosing a main supplier.

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Bruce L. Dixon, Damon McKelvey, Travis Rogers,
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INTRODUCTION

Modern field crop farming has become an increasingly complex business. Technological advances have led to the development of many seed varieties, fertilizers, and pesticides. Farmers today are faced with many decisions from the beginning of field preparation until the time the crop is harvested and marketed. Given the increasing complexity and the vast array of decision points, farmers, by necessity, are required to draw best practice advice from many sources. For instance, within the public sector, the Cooperative Extension Service and University researchers serve to disseminate information on new practices and developments. The private sector also plays an important role in the dissemination of information. For example, many farmers rely on retail pesticide suppliers for a number of services in addition to chemical purchases. As a result, the sum of each individual farmer's decisions throughout the year, including the selection of a particular retail pesticide supplier(s), have a significant impact on the yield of a particular crop and the net returns from farming.

Retail pesticide suppliers have been an integral part of agriculture for many decades. Besides being a retail source for various production inputs such as seed, fertilizer, and pesticides, many growers rely on these suppliers for production and agronomic advice, product information, equipment rental, production innovations, and information concerning market developments. Retail pesticide suppliers may also provide scouting services, custom applications, consulting, and production loans for sums of money above the cost of products and services purchased from the supplier. Hence, retail pesticide suppliers play a necessary role in agriculture by assisting growers in the production of agricultural commodities.

Study Objectives and Hypotheses

The present study focuses on the potential influences of factors such as price, convenience, financing capabilities, services provided, location, company reputation, knowledge of the farmer's individual situation, farmer characteristics, and duration of the relationship between the farmer and salesperson and/or company on farmer

¹The authors are thankful for the questionnaire and coding help provided by Diana Danforth and Karen Strain of the Department of Agriculture Economics and Agribusiness at the University of Arkansas and to Ben Klugh and Eugene Young of the Arkansas Agricultural Statistics Service.

preferences about retail pesticide suppliers. Of particular concern is the impact of these factors on (1) farm operator satisfaction, (2) most important supplier characteristics, and (3) minimum services required of a supplier. Retail pesticide suppliers can use the information gathered to explore critical aspects of nonprice competition. Moreover, results of this study will provide insight into how pricing, promotion, product, and distribution policies of retail pesticide suppliers affect purchaser satisfaction and selection of a primary retail pesticide supplier.

This research explores the relationship of farmers' satisfaction with their primary retail pesticide supplier(s) to farmer characteristics, farm operation characteristics, and marketing characteristics of retail pesticide suppliers. A further objective is to identify those factors farmers consider important in their selection of a particular retail pesticide supplier(s). Identification of such factors holds the potential for helping retail pesticide suppliers increase customer satisfaction and market efficiency through more complete and effective marketing strategies, and by increasing awareness of services preferred by farmers in addition to pesticides. An additional objective is to identify those retail supplier attributes required as minimal services a supplier must have and how those attributes are related to operator and farm characteristics. By identifying those factors required of a primary retail supplier by farmers, retail pesticide suppliers can potentially increase their market share relative to the market. To accomplish the general objectives, the research empirically examines three specific hypotheses.

The three hypotheses, stated in null form, are as follows:

- 1) A farmer's level of satisfaction with a primary retail pesticide supplier is not significantly influenced by farmer characteristics, farm operation characteristics, supplier chosen, and distance to main supplier.
- 2) Farmer characteristics and farm operation characteristics are not relevant determinants of which pesticide supplier characteristics are most important in determining a farmer's choice of a main retail pesticide supplier.
- 3) Farmer and farm operation characteristics are not determinants of minimum services a farmer expects a retail pesticide supplier to provide.

The remainder of the report is organized as follows. First is a brief overview of the context of the study. This is followed by a summary of previous work in the areas of farmers' preferences and satisfaction with retail pesticide suppliers. The following two sections present the details of the survey strategy and statistical analysis, respectively. Following the presentation of the empirical results, the report concludes with a summary and conclusions.

Background on Arkansas Pesticide Use and Farm Numbers

Between 1969 and 1992, Arkansas farmers increased agricultural pesticide expenditures by 73% (Census of Agriculture, 1992). In 1993, there were five companies located in Arkansas engaged in the formulation and preparation of ready-to-use agricultural and household pest control chemicals, including insecticides, fungicides, and herbicides. The number of firms involved in agricultural pesticides includes firms engaged in manufacturing, formulating, selling, and distributing agricultural chemicals (County Business Patterns, Arkansas, 1993). The majority of agricultural pesticides used within the state are transported from manufacturing and formulation sites located outside Arkansas. The number of workers in Arkansas employed by firms providing

agricultural services² totaled 4,713 in 1993 (Census of Agriculture, 1992). This comprised 0.5% of the total number of people employed within Arkansas.

In the last four decades, the number of farms in Arkansas diminished by 67% due to, among other factors, increased production capabilities of individual growers (Census of Agriculture, 1992). These enhanced capabilities can be attributed to technological advances and the advantages associated with achieving economies of size. From 1955 to 1994, the number of Arkansas farms declined from 133,000 to 44,000³. With a shrinking number of producers farming larger acreage bases, the ability of retail pesticide suppliers to attract new customers and maintain current clients is crucial for the prosperity of a given retail pesticide supplier. To compete in this essentially oligopolistic market structure, retail pesticide suppliers must try to increase farmers' satisfaction in an effort to maintain and increase market share. Thus, it is important to study farmer satisfaction with respect to retail pesticide suppliers and the factors important to farmers in their selection of a primary retail pesticide supplier.

PRIOR STUDIES

The literature concerned with farmers' preferences and satisfaction with primary retail pesticide suppliers is limited and not widely available in the public domain. However, marketing studies focusing on the purchasing behavior of farmers with respect to different production inputs are available. This research was largely published in the 1970s and 1980s and generally focuses on production inputs such as fertilizer, seed, feed, and farm equipment.

Funk (1972) reviews farmer buying behavior by examining shopping area, dealer and brand selection, dealer and brand loyalty, shopping behavior, adoption behavior, sources of information, impact of demonstrations, and opinion leadership. The research upon which he based his generalizations focused on farmer purchasing decisions varying from farm equipment to fertilizer. Funk (1972) developed numerous generalizations about farmer buying behavior. He found that farmers typically purchase farm supplies from the nearest source and many farmers are unable to substantially differentiate between dealers and some product brands. Funk also concluded that farmers select particular dealers for many reasons⁴ with dealer loyalty (farmers' decision to do most of their business with a particular supplier) when purchasing most farm supplies being very important.

In a subsequent study, Funk (1981) analyzed Indiana farmers, focusing on fertilizer product/service needs, buying behavior, attitudes, preferences of farmers, and the manner in which this information could be used to develop product, price, promotion, and distribution policies for manufacturers and dealers. One hundred fifty central Indiana farmers from 12 counties were surveyed. Major findings were as follows: local fertilizer dealers, other farmers, and family members are the most widely used influence groups; most dealer contacts are initiated by farmers, not fertilizer dealers. Additional findings showed that other farmers are highly influential in dealer selection, word-of-mouth communications among farmers are important in dealer selection, and importance is attached to the fertilizer dealer for providing various types of information

² Agricultural services include all agriculturally related services except forestry, fishing, hunting, and trapping.

³ Estimates from 1975 on include places with annual sales of agricultural products of \$1,000 or more.

⁴ For identification of the reasons farmers select particular dealers, see Funk (1972).

such as price, product, technology, and application information. Two-thirds of those surveyed disagreed with the statement that price is the most important consideration in purchasing fertilizer, while two-thirds agreed with the notion that establishing a good long-term relationship with one fertilizer dealer is more important than any price savings which might be possible by changing dealers frequently.

Demand for specific services was found to be dependent upon farmer characteristics. Services listed as most important by respondents included condition and availability of application equipment, provision of information through staff people, outside experts and farmer meetings, provision of custom application services, provision of soil testing services, plant tissue analysis, custom application of pesticides, and demonstrations.

Major reasons for dealer selection were dealer nearness, cheaper price, and availability of product when needed. Other reasons mentioned for dealer selection: dealer loyalty, buy or sell other products from dealer, equipment considerations, availability of specific products, dealer is personal friend/relative, good delivery, cooperative member/shareholder, good working relationship, and knowledgeable dealer/salesperson/staff. Around 50% of the farmer respondents used only one dealer, while close to 40% used two dealers, and the remaining 10% used three. Only around 38% of the farmers surveyed did not switch dealers at least one time in 1979. About 42% of the respondents stated they had used at least three dealers within the last five years. Interestingly, only 45% of farmers purchased fertilizer from their nearest dealer. Several reasons were identified as influential in the decision to use more than one dealer. They were availability of specific fertilizer product(s), price considerations, proximity of a specific product, availability of specific service(s), better service at a particular dealer, availability of specific application equipment, good dealer relationship, and dealer loyalty.

Norvell (1980) sought to determine the impact of demographic, financial, dealer, product, cultural and governmental, and sociological characteristics on farmer buying behavior as related to the purchasing of feeds and fertilizers in eastern Kansas. Norvell developed a farmer-buying-behavior model to assist in understanding the different stages in the purchasing decision. This model illustrates the purchase decision-making process. Findings and conclusions that are relevant to the present study are: over half of all farmers visited two dealers before making purchases of a given product, the majority of farmers made purchases within a 25-mile radius of their farm and most farmers considered two or three brands before making a purchasing decision. Additionally, factors that influenced farmer purchasing decisions include previous farming experience of farmers, service provided by the dealer, product quality, product availability, other family members, dealers, friends and neighbors, dealer honesty, dealer reputation, and dealer reliability. Farmer characteristics such as age, years of farming experience, type of ownership, size of farm, and education were found to be related to variation in farmer purchasing behavior.

Dealer characteristics, service, honesty, product quality, product availability and past experience were major influences on feed and fertilizer purchases regardless of the demographic characteristics mentioned above. Dealer characteristics considered important varied across age groups. Product quality and availability were listed as highly important to all age groups except for those farmers over the age of 60. Farmers in all

age groups except between ages 51-60 considered service as highly important. Service was listed as most important to the less educated, whereas farmers with college degrees perceived product quality and availability as the most influential factors determining dealer selection. However, service, as a factor influencing dealer selection, was less influential to farmers operating large farms. Farmers 40 years old and older typically purchased feed and fertilizer within a 10-mile radius, while farmers within the 51-60 age group were as likely to travel further. Farmers in the age group 21-30 appeared fairly willing to travel up to 50 miles to make a purchase.

Schrader (1983) quantified farmers' loyalty-related behavior in the purchase of farm supplies, compared the loyalty exhibited by farmers patronizing cooperatives and other types of farm supply firms, and examined the relationship between a patron's loyalty and his decision to voice complaints about firm performance rather than immediately switching his patronage. A loyalty index was developed as a composite of three measures: the proportion of total purchases made from the major supplier, the number of switches of suppliers occurring during a given time period, and the number of outlets available. Another indicator of farmer loyalty was based on a sample of farmer's reactions to a hypothetical situation in which the product involved was offered by a competing supplier at a lower price. The production input studied relevant to this study was corn herbicides. A mail survey was administered to 917 corn herbicide purchasers in Illinois.

The results showed that the majority of farmers perceived that they had a number of alternative pesticide supply sources. Farmers agreed with the statement that they had a good working relationship and were very satisfied with their primary herbicide supplier. Even at the largest price reductions tested, some farmers indicated no action to inform or switch their primary supplier, and no more than 16% indicated a switch without informing their current supplier. Farmers stated that good service and convenient location were the reasons for lack of switching primary suppliers. Lastly, Schrader found that the existence of alternatives and the presence of 10-20% of farmers willing to change suppliers for a price advantage of as little as 2-3% are sufficient to ensure price discipline within the market.

SURVEY IMPLEMENTATION

These studies, as a group, provide a foundation for the empirical investigation of the relationship between supplier characteristics and farmer satisfaction. It is clear from these studies that the relationship is complex and requires an analytic strategy that simultaneously incorporates the many potentially confounding variables. Such an analytic strategy is presented in the following sections.

A telephone survey was utilized to gather data from farm operators to test the hypotheses of the present study. A copy of the survey instrument used by the enumerators is in Appendix A. The instrument was pretested on three individuals. Enumerators were lectured prior to survey administration as to the purpose of the study.

Twenty-six counties from the Arkansas Delta region served as the population sampled for this study. These 26 counties make up agricultural statistical reporting districts three (CRD3), six (CRD6), and nine (CRD9). These three statistical reporting districts are typically referred to as the Arkansas Delta region and represent the largest

percentage of the state's cotton, grain sorghum, rice, wheat, and soybean production. The survey was administered over three days in 1996, November 18 and 19, from 5:00 p.m. until 9:00 p.m., and on November 20, from 7:00 a.m. until 12:00 p.m., by the Arkansas Agricultural Statistics Service. The survey sample size was a random sample of 600 farmers with farm sizes between 500 and 7,500 acres. The number of farmers surveyed in a given CRD was based upon a weighted number of the farmers in each of the three CRD's. Table 1 gives the number of farmers in the sample of each CRD surveyed and the number of responses.

The breakdown of the responses/non-responses on the "Arkansas Delta Farmers' Preferences and Satisfaction When Selecting an Agricultural Pesticide Supplier" surveys are as follows: 290 completed survey instruments, two incomplete survey instruments⁵, 150 refusals, and 158 incorrect phone numbers or producers that were inaccessible. Several agricultural producers were deer hunting during the days that the survey was administered which may have accounted for the large number of inaccessible farmers. Greater detail on the survey procedure and data management are given in McKelvey (1997).

Table 1. Farm operator population, numbers sampled, and numbers responding by crop reporting district.

CRD	Population Size (Farmers)	Farmers Included in Sample	Completed Questionnaires	Percent of Farmers Surveyed
3	1,366	258	128	9.37%
6	1,365	257	122	8.94%
9	471	85	36	7.64%
Total	3,202	600	290¹	9.06%

¹The total number of completed surveys was 290, which included four questionnaires that we were unable to classify into a CRD. The total number of completed surveys is used in determining percentage of farmers surveyed.

STATISTICAL ANALYSIS

Univariate Analysis

Table 2 provides a summary of characteristics describing the farm operators participating in the survey. The average respondent was 49 years old (s.e. .627)⁶ and since his or her 18th birthday, had been making farm management decisions for 25 years (s.e. .648). Thus, most operators have spent their adult lives in agriculture. Approximately half of the sample farmers had some education beyond a high school diploma. A majority of farm operators 58%, (s.e. 3.00%) were members of a cooperative. On average, the farm operators were 6.39 (s.e. .268) miles from the closest pesticide supplier and the mean number of suppliers used in 1996 was 1.87 (s.e. .067). Soybeans were the main crop produced with rice second and cotton and wheat virtually tied for third. Among those farmers claiming to have only one main retail supplier, they were located an average 8.03 (s.e. .406) miles from that supplier and had used that supplier an average of 12 (s.e. .616) years.

⁵The "incomplete" questionnaires contained either too little information or no identification of main supplier(s).

⁶Figures in parentheses preceded by s.e. are the standard errors of the means or proportions preceding the parentheses.

Table 2. Descriptive statistics of farm operator characteristics and farm operations.

	Number of Observations	All Respondents	Age Group*		
			18-45	46-55	+56
Operator Characteristics					
Percent of total respondents (%)	290	100.00	41.61	30.77	27.62
Mean years farming	286	25.41	17.43	26.18	36.38
Agricultural cooperative member (%)	279	58.06	61.06	60.71	51.28
Mean distance to main supplier (miles)**	242	8.03	8.21	7.69	8.28
Mean distance to closest supplier (miles)	288	6.39	6.32	6.42	6.56
Mean number of suppliers used	272	1.87	1.86	1.90	1.81
Mean years main supplier has been used**	251	12.25	10.72	10.96	15.51
Mean age	286	48.70	38.80	50.22	61.94
Mean level of satisfaction with main supplier (1-5)**	244	4.57	4.53	4.54	4.63
Operator Education Level					
High school or below (%)	289	49.13	45.38	42.53	62.03
Some college (%)	289	29.76	28.57	35.63	25.32
College graduate (%)	289	21.11	26.05	21.84	12.66
Farm Location and Operation Characteristics					
Main farm located in CRD3 (%)	284	44.37	44.54	40.23	48.72
Main farm located in CRD6 (%)	284	42.61	41.18	48.28	38.46
Main farm located in CRD9 (%)	284	13.03	14.29	11.49	12.82
Mean percent of land owned (%)	278	31.23	23.62	29.15	43.92
Mean farm size (acres)	286	1868.35	1831.59	1916.70	1893.65
Mean percent acres in cotton (%)	285	13.85	13.36	13.27	15.49
Mean percent acres in soybean (%)	285	46.89	47.84	45.80	46.36
Mean percent acres in wheat (%)	285	13.89	11.92	15.08	15.61
Mean percent acres in rice (%)	285	20.68	20.96	21.98	18.61
Mean percent acres in other (%)	285	4.69	5.92	3.87	3.93

* Excludes four observations where age was not given.

**Computed for those respondents claiming only one main supplier.

There were few substantial differences among age groups except in years farming. Fewer of the farmers 56 or older were members of a cooperative and this age group was slightly more satisfied with their main supplier and had received less formal education than farmers 55 and younger. The older group of farmers owned a larger percentage of the land they farmed.

The average respondent farmed 1,868 acres (s.e. 87.3) in 1996. The locations of the respondents' farms are as follows: 44% of the respondents came from CRD3, 43% came from CRD6, 13% came from CRD9, and the remaining 1.38% could not be classified into a distinct CRD because their farming operation spanned multiple CRD's or the location was not reported.

In 1996, 10 retail pesticide suppliers accounted for roughly 73% of the retail pesticide suppliers identified by respondents as sole main retail pesticide suppliers in CRD's 3, 6, and 9. The remaining 27% of sole main retail pesticide suppliers consisted of 33 retail pesticide suppliers who were identified by fewer than five respondents. All univariate analyses below pertaining to main retail pesticide supplier include those respondents who listed only one supplier as their main retail pesticide supplier in 1996. There were 252 respondents claiming only one main supplier, and 38 respondents mentioned two or more main retail pesticide suppliers for the year 1996.

Fig. 1 shows the ratings by respondents for a given list of reasons why they chose their current main retail pesticide supplier. The respondents were asked to rate the importance of each reason on a scale of 1 to 5. Reputation, delivery services, and long-term relationship with a salesperson had the highest ratings with means of 4.33 (s.e. .068), 4.26 (s.e. .071), and 4.24 (s.e. .067), respectively. Financing, equipment rental, and scouting services had the lowest ratings as reasons why the farmers chose their current main pesticide supplier. Respectively, these attributes had means of 2.89 (s.e. .108), 3.09 (s.e. .104), and 3.09 (s.e. .107). There were also several add-in responses supplied by the respondents that were frequently mentioned including good service, friendly people, and knowledgeable employees.

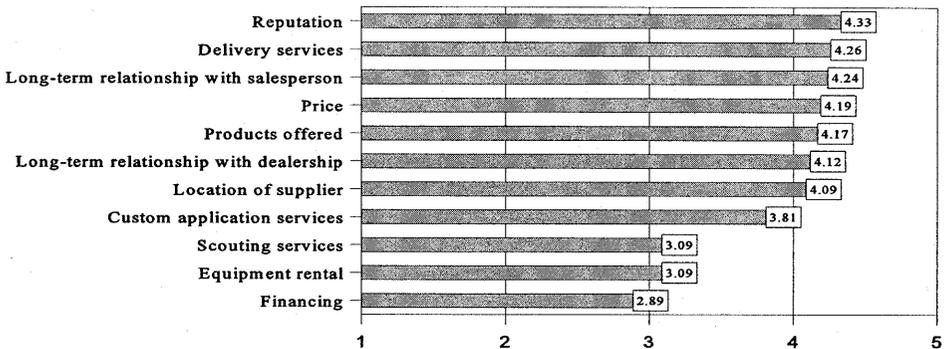


Fig. 1. Main retail pesticide supplier attributes most important to the farmer*.

*Refers to respondents with only one main retail pesticide supplier.

The differences in the rating levels of reputation, delivery service, and relationship are all statistically significantly higher than the lowest rated three attributes at the .05 level⁷. Thus, customers are more sensitive to some retail supplier attributes than others in selecting their main retail supplier. Services that might seem beneficial when choosing a pesticide supplier (e.g. scouting services, equipment rental, and financing) are not as important to the respondent as the overall reputation⁸ of a given supplier. This does not imply that retail suppliers can ignore services such as financing, equipment rental, and scouting. These services may be offered by almost all suppliers and thus deemed unimportant when farmers select among suppliers. A question about

⁷Statistical significance was determined if the outcome of dividing the differences of the means by the standard errors of the differences was greater than the absolute value of two. The standard error of the differences was measured by multiplying the largest standard error of the means by two. Multiplying the largest standard error by two instead of the square root of two, which could be used on uncorrelated variables, is a conservative measure for the data. Thus, any difference noted is clearly statistically significant at the .05 level.

⁸A definition of reputation was not provided to the respondents. Therefore, reputation may be a function of delivery services, long-term relationship with salesperson, price, products offered, etc.

whether such services are necessary addresses this issue. This is pursued further in examining responses to the question about necessary services.

The main supplier attributes that have means between 3.81 to 4.33 are, statistically, significantly higher than the attributes that have means between 2.89 and 3.09. Also, it was surprising that price, with a mean of 4.19 (s.e. .072), was not a higher priority when choosing a main pesticide supplier. This lack of prominence of price as a selection criterion might be reflective of a competitive environment in the pesticide market, or price leadership by a few firms. Like price, location was unexpectedly rated lower than many of the other supplier attributes, nonetheless, 78.9% of the farmers naming only one primary supplier claimed that the supplier was also the closest supplier to their farm.

In 1996, the respondents used an average of 1.87 (s.e. .061) retail pesticide suppliers. About 44.5% (s.e. 3%) of the respondents used only one supplier in 1996, while 33.8% (s.e. 2.7%) of the respondents used two suppliers. The remaining 21.7% (s.e. 2.5%) of the respondents used between three and six suppliers. Fig. 2 lists reasons farmers had for using multiple retailers and the proportion of farmers who claimed a particular reason as a justification for using multiple retailer suppliers. The three most common reasons for the respondents using more than one pesticide supplier in 1996 were: availability of certain pesticides (78.2% [s.e. 3.4%]), long-term relationship with a supplier (76.7% [s.e. 3.5%]), and availability of specific services (73.2% [s.e. 3.6%]). The next three most frequent reasons for farmers using multiple retail suppliers were: price (71.8% [s.e. 3.7%]), availability of fertilizer (66.2% [s.e. 3.9%]), and location (66.2% [s.e. 3.9%]). The three least important reasons for farmers using multiple retail suppliers were amount of credit extended by a supplier (40% [s.e. 4.1%]), availability of seed (56.1% [s.e. 4.1%]), and availability of specific equipment for rent (58.4% [s.e. 4%]).

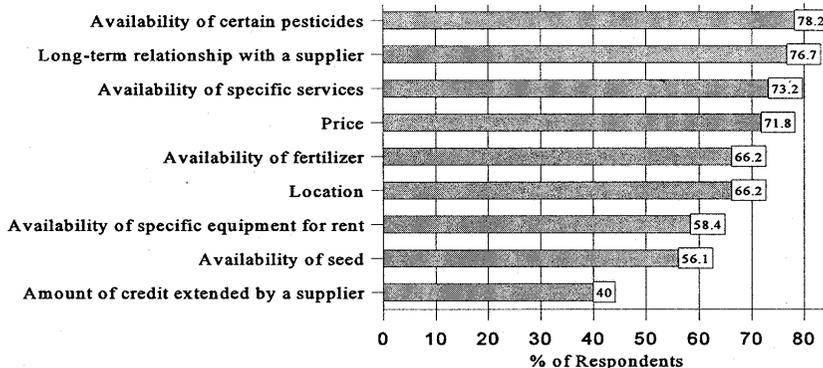


Fig. 2. Reasons for farmer using multiple retail suppliers*.

*Refers to respondents with only one main retail pesticide supplier.

Even though 55.5% of the respondents used more than one pesticide supplier in 1996, this was not indicative of dissatisfaction with the main supplier. When asked, "On a scale of 1 to 5, with 1 being not at all satisfied and 5 being very satisfied, how satisfied are you with your main retail pesticide supplier?" the average response was 4.57 (s.e. .041) for all respondents who claimed only one main retail pesticide supplier. The average response for respondents who exclusively used only their main supplier was 4.716 (s.e. .045). However, respondents with other suppliers in addition to their one main supplier rated their main retail supplier as an average of 4.441 (s.e. .070). Therefore, respondents using more than one supplier were not as satisfied with their main supplier as respondents using only their main supplier. This difference is statistically significant at the .05 level.

Farm operators were asked which services a supplier must provide for an operator to do business with them. The seven items that were listed are given in Fig. 3 along with the proportion of farmers requiring that service. The three most common services the respondents mentioned were: delivery of products (60% [s.e. 2.9%]), a full-time salesperson, (53.8% [s.e. 3%]), and custom application (52.4% [s.e. 3%]). Note that these responses are roughly similar to the responses of what is important for selecting their main supplier. For this latter question, delivery of products (delivery services) was rated as the second highest attribute important to the farmer, and a full-time salesperson, which might be similar to a long-term relationship with a salesperson, was rated the third highest attribute.

The three least necessary services a supplier must provide were: scouting services (23.1% [s.e. 2.5%]), offers other products like seed and tractor parts (28.6% [s.e. 2.7%]), and financing (36.6% [s.e. 2.9%]). These results largely agree with the results to the responses of what is important in selecting the main supplier, because scouting services and financing were two of the three lowest rated attributes by farmers.

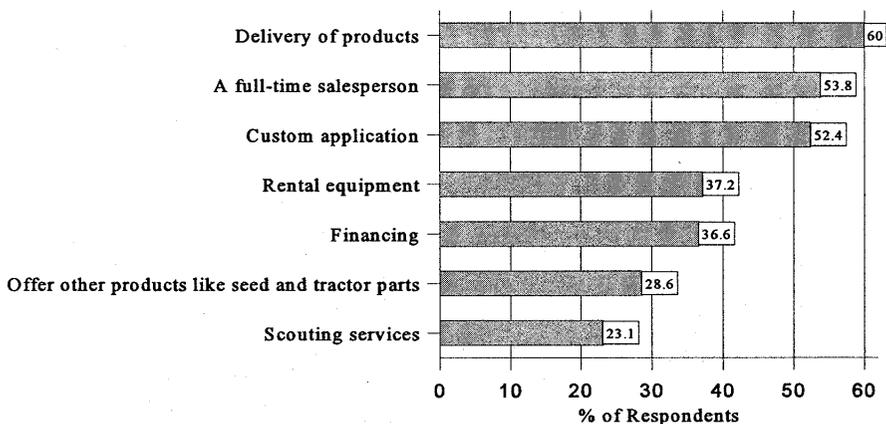


Fig. 3. Minimum services farmer expects retail suppliers to maintain*.

* Refers to all respondents.

Farmer Satisfaction with Retail Supplier

This section focuses on testing the first hypothesis, which stated in the null form, is: "A farmer's level of satisfaction with a primary retail pesticide supplier is not significantly influenced by farmer characteristics and farm operation characteristics as well as choice of supplier and distance to main supplier." The dependent variable used in testing this hypothesis was Q10.0 from Appendix A, "On a scale of 1 to 5, with 1 being not at all satisfied and 5 being very satisfied, how satisfied are you with your main retail pesticide supplier." To test this hypothesis we used the ordinaly ranked limited dependent variable (ORLDV) model as described in Greene (1995). This model is much like a classical regression model except that the dependent variable is integer instead of continuous and the integer only indicates order of ranking, not a cardinal measure of satisfaction with a supplier. For example, it would be incorrect to say a 2 is twice the satisfaction of a 1. The model would be equally applicable if the rankings were by letters with A through E, with A being the least satisfied and E being the most satisfied.

To estimate the parameters of this model, the dependent variable values must begin with 0 to allow for estimation of the intercept term. Therefore, the recoded satisfaction ratings were: 1, 2, and 3 = 0, 4 = 1, and 5 = 2. The first three categories were grouped together due to the low number of responses in this range. Only respondents who claimed one main retail pesticide supplier could be used in this estimation and analysis.

In the initial model estimated, level of satisfaction was specified to be a function of a number of variables including the farmer's CRD, education, crops planted, distance of supplier to farm operator, and the particular supplier. Preliminary estimation of the model yielded only one independent variable (number of retail suppliers used) that was statistically significant with the level of satisfaction at the 5% level. Therefore, due to the low number of significant variables, a second model was estimated that included the farmers' ratings of supplier attributes most important to the farmer in selecting their main retail supplier as independent variables in addition to the initially hypothesized list of independent variables. However, in the third and final model only those two farmer ratings of supplier attributes that were statistically significant in the second model were included with the original independent variables in the final model presented in Table 3. The two significant attributes are scouting and reputation. Binary variables are used to represent each primary retail supplier. Seven of the suppliers were mentioned as primary suppliers by 10 or more of the respondents and each of these suppliers was given their own binary variable. All of the other retail suppliers were pooled into an "other" category with its own binary variable. In estimating the model the coefficients of the supplier binary variables were restricted to sum to zero so that the coefficients could be interpreted as deviations from the intercept term. Positive coefficient estimates associated with one of these binary variables indicates a higher than average level of satisfaction associated with this supplier and a negative estimated coefficient indicates lower satisfaction than average for the associated supplier.

The ORLDV model classified 136 of the 190 observations correctly (72%). The model correctly predicted 107 of the 120 observations (89%), where farmers ranked their main retail supplier as very satisfied. The model also correctly predicted 27 out of 60 farmers who ranked their main supplier just below very satisfied. However, the model only correctly predicted 2 out of the 10 observations in the lowest satisfaction category.

Table 3. Ordinally ranked limited dependent variable model estimates for model of farmer satisfaction.

VARIABLE	Estimated COEFFICIENT	Z=B/S.E. *
Constant	0.49679	0.403
Main farm located in crop district 6	-0.54559	-1.727
Main farm located in crop district 9	-0.48785	-1.310
Percent of acres planted in cotton	-0.25827	-0.223
Percent of acres planted in soybean	0.62234	0.552
Percent of acres planted in wheat	-0.58097	-0.403
Percent of acres planted in rice	-0.17274	-0.158
Years of farming experience	0.001178	0.101
Supplier 1	-0.41498	-0.596
Supplier 2	-0.20548	-0.774
Supplier 3	-0.014934	-0.022
Supplier 4	0.45055	0.655
Supplier 5	-0.63696	-1.798
Supplier 6	0.068516	0.205
Supplier 7	0.54290	1.223
Other suppliers	0.21040	0.883
Cooperative member	-0.088547	-0.318
Number of suppliers within 15 miles	-0.0083364	-0.160
Total crop acreage planted	0.000038782	0.338
Years main supplier has been used	0.000451	0.030
High school or below	-0.17801	-0.696
College graduate	-0.31579	-0.919
Number of retail suppliers used	-0.28562	-2.515
Percent of land owned	0.0020616	0.546
Distance from main supplier	-0.00026507	0.013
Reputation	0.39915	4.671
Scouting services	0.19078	2.130
MU(1)**	1.7640	5.887

Number of observations=191

Frequencies of actual and predicted outcomes

Predicted outcome has maximum probability.

Actual	Predicted			TOTAL
	0	1	2	
0	2	7	1	10
1	1	27	32	60
2	0	13	107	120
TOTAL	3	47	140	190

* This is the ratio of the estimated coefficient divided by its standard error. For large samples it has a standard normal distribution.

**The parameter estimated for MU is the threshold value for the dependent variable.

Among the significant independent variables, number of retail suppliers used had a coefficient estimate of -.286. This implies that the effect of farmers using more than one retail supplier was to be less satisfied with the main supplier than those farmers using only one supplier. This lower satisfaction level is predictable, because a farmer exclusively using only one supplier was probably quite content whereas those farm operators using multiple suppliers had some reason to be less satisfied with their main supplier. There were 151 (55.5%) respondents who used more than one retail supplier in 1996.

The seven binary variables relating to suppliers one through seven and the binary variable representing other suppliers, which includes all suppliers mentioned fewer than 10 times, were not statistically significantly different from 0 at the 5% level. This implies that for a given level of the other independent variables, no one individual supplier's clients were more or less satisfied than the sample as a whole.⁹ There were 85 respondents whose main retail supplier was grouped into the other suppliers category.

The reason for adding the attributes from the question asking respondents to rate reasons why they chose their current main pesticide supplier to the independent variable list was to determine if there were any of the farmers attribute ratings that were statistically significantly affecting the farmers' levels of satisfaction with their main supplier. The attributes "reputation" and "scouting services" were significant. Their coefficient estimates were .399 and .191, respectively. This implies that the higher the farmers rated reputation and scouting services as important attributes when selecting their main supplier, the more satisfied they were likely to be with their main supplier. Thus, even though scouting services were not ranked by most respondents as very important reasons for choosing a main retail supplier, those farmers who valued scouting more highly were more likely to be more satisfied with their main supplier. So scouting is important in the sense that it leads to higher levels of satisfaction among those farmers who value it more highly. Remarkably, education, farm size, location of farm, crop enterprise mix, and distance of retailer from the farm were not significant. This seems to indicate a farmer clientele responding to cost minimizing strategies and retailers who compete closely with each other.

This section discussed the statistical analysis of the first hypothesis tested in the study. There is evidence to reject the null hypothesis that farmer's level of satisfaction with a main retail pesticide supplier is not significantly influenced by various independent variables. The results show that number of retailers used and two supplier attributes, reputation and scouting services, had a significant statistical bearing on how the respondents rated their main supplier. Therefore, it would appear that suppliers cannot increase farmer satisfaction levels by segmenting their clients into different farmer or farm operation groups and trying to appeal to those groups other than to those operators using multiple suppliers. As noted earlier, farm operators using multiple suppliers ranked product availability, long-term supplier relationship, and availability of specific services as the most important reasons for using multiple suppliers. This lack of substantial market segmentation probably reflects a highly competitive industry where farmers are quick to adopt least-cost behavior regardless of their particular idiosyncratic or farm characteristic classifications.

Supplier Attributes Most Important to the Farmer

This section focuses on testing the second hypothesis, which, stated in the null form, is: "Farmer characteristics and farm operation characteristics are not relevant determinants of which pesticide supplier characteristics are most important in determining a farmer's choice of a main retail pesticide supplier." The dependent variable used to test this hypothesis came from the question asking the operator to rate on a scale of 1 to 5

⁹There is, however, statistical evidence that the effect of using a supplier in the "other suppliers" group was more satisfaction than that provided to farmers by one of the other seven suppliers at the .05 level, but not the .01 level.

the importance of 11 supplier attributes in choosing their current, main pesticide supplier. These variables are listed in Fig. 1.

To test this hypothesis, ORLDV models, similar to the method used to test hypothesis one, were utilized. The respondents rated each of the attributes from this question on a scale from 1 to 5, with 1 being not important and 5 being very important. Due to a lack of variation in the dependent variables, the first two ratings (1 and 2) were collapsed into one group. Only respondents who claimed only one main retail pesticide supplier (252 observations) were used in estimating these models. The farm operators were asked to rank 11 different supplier characteristics. Since each one of these were ranked on the 1-to-5 scale, 11 different ORLDV models were estimated.¹⁰ Only those independent variables that were statistically significant at the 5% level are discussed.

The independent variable of number of retail suppliers used (NUMRTL) showed a pattern of statistical significance with 7 of the 11 attributes (products offered, reputation, long-term relationship with a salesperson, long-term relationship with dealership, financing, location of supplier, and scouting services). The coefficient estimates of NUMRTL in all seven equations were negative (-.207, -.196, -.360, -.206, -.285, -.194, and -.197, respectively). Hence, the farmers who used more than one retail supplier tended to be less concerned with these attributes, compared with farmers who used only one supplier. However, the importance of price, delivery of services, equipment rental, and custom application was not affected by the number of retail suppliers used. This might imply that emphasis on delivery of services, price and custom application, which were all relatively important in selecting a main supplier, might increase appeal to all farmers. However, emphasis on the seven attributes significantly related to number of retail suppliers used will generally appeal more to single supplier users than to farmers using multiple suppliers.

There was also statistical significance between the independent variable Crop Reporting District 6 (CRD6) and the attributes of equipment rental, custom application services, and scouting services. The coefficient estimates for CRD6 were .62, .467, and .705, respectively. Therefore, those farmers whose main areas of operation were located in CRD6 tended to rank equipment rental, custom application, and scouting services as more important attributes when choosing their main pesticide supplier than those farmers located in CRD3. Also, farmers located in CRD9 tended to rank equipment rental higher than those farmers located in CRD3. This could be due to a lower proportion of equipment intensive row crops (i.e., cotton and rice) in the more northerly areas in eastern Arkansas.

Furthermore, farmers with a college degree or higher, *ceteris paribus*, rated price, delivery services, and scouting services (statistically significant coefficient estimates of -.621, -.511, and -.643, respectively) as not as important when choosing a main supplier as those farmers who had the equivalent of a high school diploma or less. Farmers with at least some college or vo-tech experience tended to rank scouting services (coefficient estimate of -.540) significantly lower than those farmers who had the equivalent of a high school diploma or less.

¹⁰The characteristics are: distances to nearest and main supplier, number of suppliers within 15 miles of the farm, number of retail suppliers used in 1996, years of experience in farming, educational level, CRD of farm, percent of acres in soybeans, cotton, rice, and wheat, whether farmer was a member of a cooperative, percent of land owned and total acres cropped.

There were four remaining independent variables (distance from main supplier, length of farming experience, concentration of retail suppliers with respect to location of farmers' main area of operation, and whether farmer was a member of a cooperative) that had statistical significance with some of the attributes. Given that none of these variables were significant with 3 or more of the 11 attributes, we view the significance of these independent variables as potentially spurious and therefore not worthy of further discussion.

This section discussed the statistical analysis of the second hypothesis tested in the study. An important statistical point should be observed here about spurious statistical significance. For the analysis there are 16 independent variables for each of the 11 supplier attributes so that even if all 11 variables are not related to the dependent variable, 5% of them would appear to be significant when testing at the 5% significance level. In the specific application here, 176 coefficients were estimated so nine would test as significant on average for a given sample even if all the independent variables were unrelated to the dependent variables. Thus, while there seems to be a definite pattern of significance with respect to number of retailers used, the significance of the other independent variables mentioned should be viewed with caution.

The results show that the number of retailers used by farmers is significantly, inversely related to the importance of seven supplier characteristics in farmer selection of their main supplier. Also, the importance of several attributes varied as a function of the CRD where the main area of operation is located. Farmers located in CRD6 tended to value equipment rental, custom application services, and scouting services more than those farmers located in CRD3. Also, farmers located in CRD9 tended to value equipment rental more than farmers located in CRD3. The effect of having a college degree or higher was to value price, delivery, and scouting services less than having the equivalent of a high school diploma or less.

Necessary Services a Dealer Must Provide

This section focuses on testing the third hypothesis which, stated in null form, is: "Farmer and farm operation characteristics are not determinants of minimum services a farmer expects a retail pesticide supplier to provide." To test this hypothesis the farmers responded to the question asking if a farmer would do business with a supplier who did not offer any one of a list of seven services. As listed in Fig. 3, these services were: financing, scouting services, rental equipment, delivery of products, custom application, full-time salesperson, and availability of other products like seed and tractor parts. A separate logit model was estimated for each of these seven attributes listed. All respondents could be included in this analysis.¹¹

Logit models are typically employed to identify which factors influenced the decision where the set of alternative actions is limited. In our application the outcome is binary in that a farm operator can say yes or no to an attribute being necessary. The logit model can be written as,

¹¹In order to be included in an estimation sample, an observation could not have any missing observations for the variables in a given model.

$$P(y_i=1 | x_i) = \frac{1}{1+\exp(-B'x_i)}$$

letting y_i be the observation on the dependent variable for the i^{th} farmer where $y_i = 1$ indicates a “yes” implying the attribute is not necessary and $y_i = 0$ implying the attribute is necessary, where B is a vector of parameters to be estimated and x_i is the vector of characteristics of the i^{th} farm operator.¹² Note that the model is non-linear in $B'x_i$, so that the coefficients, B , do not have the interpretation of partial derivatives as in the classical linear regression model.

The first attribute (financing) had no farmer demographic and farm operation characteristics that were statistically significant. However, the data show 36.6% of the respondents said they would not do business with a supplier who did not offer financing. The second attribute considered (scouting services) also had no independent variables that were statistically significant at the 5% level. There were 67 (23.1%) respondents who said they would not do business with a retail pesticide supplier that did not offer scouting services.

The third attribute (rental equipment) analyzed also had only one independent variable (length of farming experience) that was statistically significant. The coefficient estimate for the experience (years in farming) variable was 0.0302. The significance of the experience variable implies that as the number of years a farmer has been making farm management decisions increases, the more willing a farmer will be to deal with a supplier who did not offer rental equipment. There were 108 (37.2%) respondents who said they would not do business with a retail pesticide supplier who did not offer rental equipment. Delivery of products had no farmer demographic and farm operation characteristics that were statistically significant. However, the univariate analysis results showed that 174 (60%) of the respondents said they would not do business with a supplier who did not offer delivery of products.

The fifth attribute (custom application) analyzed had four statistically significant independent variables at the 5% level (number of retail pesticide suppliers used, location of farm in CRD6, educational level (attained some college), and whether they were a member of a cooperative). The coefficient estimates for the variables were 0.423, 0.708, 0.795, and 0.730, respectively. The significance of the three positive coefficients implies that as the farmers used more retail suppliers, had some college and were members of a cooperative, the more willing a farmer would be to trade with a supplier not offering custom application services. However, the variable CRD6 had a negative coefficient estimate, which indicates that farmers located in CRD6 were more likely to require custom application as a service that a supplier must provide. There were 152 (52.4%) respondents who said they would not do business with a retail pesticide supplier not offering custom application services.

The sixth attribute (a full-time salesperson) had one independent variable (total of crop acres planted) that was statistically significant. The coefficient estimate of total

¹²The characteristics are: distances to nearest and main supplier, number of suppliers within 15 miles of the farm, number of retail suppliers used in 1996, years of experience in farming, educational level, CRD of farm, percent of acres in soybeans, cotton, rice, and wheat, whether farmer was a member of a cooperative, percent of land owned, and total acres cropped.

crop acres was -0.0003. This indicates that as the number of crop acres increased, the less likely a farmer would be to trade with a supplier not having a full-time salesperson. The seventh attribute (offers other products like seed and tractor parts) did not have any independent variables that were statistically significant at the 5% level. The number of respondents who said they would not do business with a retail pesticide supplier who did not offer either a full-time salesperson or offer other products like seed and tractor parts were 156 (53.8%) and 83 (28.6%), respectively.

This section discussed the statistical analysis of the third hypothesis tested in the study. In general, the evidence refuting the null hypothesis is not strong in a statistical sense. Only one of the attributes, custom application, had more than one significant independent variable. Three attributes—financing, rental equipment, and full-time salesperson—had one significant variable and the remaining attributes had none. With a large number of independent variables as in the tests of the second hypothesis, the finding that one variable is significant is not impressive evidence in favor of the particular variable. On the basis of our statistical analysis it is not possible to segment the market definitively in terms of farmer or farm operation characteristics as to which of the seven attributes must be provided. What is important is that all these attributes were required by at least 23% of respondents (scouting services) and up to 60% of respondents (delivery of products). Thus these attributes are important to various segments of purchasing customers, but not segments we were able to definitively identify.

SUMMARY AND CONCLUSIONS

Over the last four decades, the number of farms in Arkansas has decreased by about two-thirds. One factor related to the decline in farm numbers is the improved productivity of individual growers, which can be attributed to technological advances and the advantages associated with achieving economies of scale. However, with a shrinking number of producers farming larger acreage bases, the need for retail pesticide suppliers to capture new customers and maintain current ones is critical. Therefore, to compete in this oligopolistic market structure, it is crucial for retail pesticide suppliers to better understand the demands and preferences of their patrons. A telephone questionnaire was designed to identify factors leading to customer satisfaction for eastern Arkansas field crop farmers. The questionnaire was administered by enumerators from the Arkansas Agricultural Statistical Service in Little Rock, Arkansas, over three days, November 18, 19, and 20, 1996.

The results from the questionnaire reveal several notable findings. First, the data reject the hypothesis that a farmer's level of satisfaction with a primary retail pesticide supplier is not significantly influenced by farmer characteristics and farm operation characteristics as well as choice and location of main supplier. The data indicate that the more suppliers respondents used, the less satisfied they were with their main retail supplier. We also found that those respondents who rated reputation high as an important reason why they chose their main supplier tended to be more satisfied with their main supplier than those who rated reputation lower. Thus, a good reputation is important for suppliers since there is a large segment of the sample of farm operators, 61.9%, who rated reputation as very important in selecting a primary supplier.

The second major finding of our study is that some farmer characteristics and farm operation characteristics are significant determinants of which pesticide supplier

characteristics are most important in determining a farmer's choice of a main retail supplier. First, the statistical models indicated that as a respondent used more suppliers they were less likely to rate a given service as highly important in selecting a retail pest-icide supplier for 7 of 11 attributes. Also, those respondents whose main area of operation was located in CRD6 or CRD9, on average, rate equipment rental more highly in selecting a supplier than those farmers located in CRD3, as well as custom application and scouting services for those farmers located in CRD6. Additionally, the effect of having a college degree or higher was to rate price, delivery, and scouting services less highly than those having the equivalent of a high school diploma or below. Less emphasis was placed upon scouting services when choosing a main retail supplier more than any other supplier attribute mentioned. The three most important reasons indicated by respondents in choosing their main supplier were: reputation, delivery service, and long-term relationship with a salesperson.

The third major finding from our results is that the evidence on whether farmer characteristics and farm operation characteristics are determinants of minimum services a farmer expects a retail pesticide supplier to provide is weak. Thus, attempts to segment a population of farmers by characteristics such as farm size or educational level in terms of minimum services were not successful. The three most common services the respondents mentioned in the questionnaire for an operator to patronize a pesticide supplier were: delivery of products, full-time salesperson, and custom application.

Overall, our results revealed several important findings relating to farm operator patronage of retail pesticide suppliers.

- Around 79% of those respondents naming only one main supplier said the closest supplier to them was their main supplier. This is consistent with Funk's (1972) review of farmer buying behavior, where he found that farmers typically purchase farm supplies from the nearest source.
- If a main supplier is not satisfactory in multiple ways, customers will split their patronage. Additionally, dealer reputation and delivery services were important attributes when farmers chose their main supplier, while scouting services, equipment rental, and financing were not as important for farmers in choosing their main supplier.
- The average respondent has been using their main supplier for 12 years. This implies there is strong customer loyalty between a farmer and his/her supplier, which was similar to Funk's (1972) discovery that dealer loyalty when purchasing most farm supplies is very high. Also, respondents from our study were generally very satisfied with their main supplier, which was also similar to Schrader et al. (1983) findings. Our study also revealed that respondents who used multiple suppliers ranked the availability of certain pesticides as the most important reason for using multiple suppliers.
- Among respondents using multiple suppliers, the four most prevalent reasons were availability of certain pesticides, long-term relationship with supplier, availability of specific services, and price.

Overall, the research shows that farm operators in eastern Arkansas are satisfied with their retail pesticide suppliers. Not all farm operators display exclusive loyalty to only one supplier so there is potential for greater market share for a given supplier,

but it appears to be a very competitive market. The results further indicate that it is difficult to segment the market in terms of education levels, crop mix, or farm size. Nonetheless, some services and supplier attributes are more important than others in patron's preferences, indicating that suppliers must carefully weigh which services to offer.

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APPENDIX A
 ARKANSAS DELTA FARMERS' PREFERENCES AND
 SATISFACTION WHEN SELECTING A PRIMARY RETAIL
 PESTICIDE SUPPLIER TELEPHONE SURVEY

Q1.0 Introduction

“Hello, My name is (NAME) and I am conducting a survey for the University of Arkansas. We are trying to find out what you expect from a retail pesticide supplier and how satisfied you are with your current supplier. May I speak with the person who makes the production decisions on your farm?”

[If that person, continue. If a new person, repeat above or schedule a suitable time to speak with that person.]

Q1.1 Majority of Pesticide Purchasing Decisions

Can you take about five to ten minutes to answer these questions? Your answers are voluntary and will be kept strictly confidential.

I am going to ask you a number of questions about your main retail pesticide supplier. By that I mean the retail pesticide supplier that received the largest amount of your 1996 business based on total dollars you spent on pesticides.

[If a definition of pesticide is needed, answer with: any chemical used to control insects, diseases, or weeds.]

Q2.0 Identification of Main Retail Supplier

In 1996, who was your main retail pesticide supplier?

[Do not read list. Record only ONE answer.]

- | | |
|---------------------------------|---|
| 1) Terra International | 6) Cleveland Chemical or Jimmy Sanders Inc. |
| 2) Helena Chemical | 7) Lawhon Farm Services |
| 3) Tri-State Delta Chemical | 8) Chickasaw |
| 4) SF/Services (Farmers Supply) | 9) Other (please specify) |
| 5) Farmers' Coop | |

Q2.1 Years of Service

How many years have they been your main supplier?

Q3.0 Number of Retail Suppliers Used in 1996

How many different retail pesticide suppliers did you use in 1996?
[If ONE skip to Q5.0]

Q4.0 Reasons For Farmer Using Multiple Retail Suppliers

I am going to read you a list of possible reasons for using more than one pesticide supplier in 1996. Please answer yes or no if that is a reason you used more than one supplier.

Reason	Yes	No
01 Price	1	0
02 Location	1	0
03 Availability of certain pesticides	1	0
04 Availability of specific equipment for rent	1	0
05 Availability of specific services	1	0
06 Availability of fertilizer	1	0
07 Availability of seed	1	0
08 Long-term relationship with supplier	1	0
09 Amount of credit extended by a supplier	1	0
10 Are there any other reasons why you used more than one retail pesticide supplier (please specify)? _____		

Q5.0 Member of Co-op

Are you a member of a co-op that sells pesticides?

- 1 Yes
- 0 No

Q6.0 Main Retail Pesticide Supplier Attributes Most Important To The Farmer

Please rate the following reasons why you chose your **current** main pesticide supplier. (With one being not important and five being very important.)

Reason	<i>[Circle ONE per line]</i>				
01 Price	1	2	3	4	5
02 Products offered	1	2	3	4	5
03 Reputation	1	2	3	4	5
04 Long-term relationship with salesperson	1	2	3	4	5
05 Long-term relationship with dealership	1	2	3	4	5
06 Financing	1	2	3	4	5
07 Location of supplier	1	2	3	4	5
08 Delivery Services	1	2	3	4	5
09 Equipment rental	1	2	3	4	5
10 Custom application services	1	2	3	4	5
11 Scouting services	1	2	3	4	5
12 Are there any other reasons why you chose your _____ current main pesticide supplier (please specify)?					

Q7.0 Distance of Nearest Retail Supplier To Farmer

In the following questions, your **main farm operation** is the location that contains the majority of the land you used for production in 1996.

How close in miles is the nearest pesticide supplier store to your main farm operation?

Q7.1a Distance Of Main Retail Supplier To The Farmer

Is this supplier your main pesticide supplier?

1 Yes 0 No

[Skip to Q8.0] How close in miles is your main farm operation to your main retail pesticide supplier? _____

Q8.0 Concentration of Retail Suppliers With Respect To Location of Farmer's Main Area of Operation.

Considering your main farm operation, estimate how many retail pesticide suppliers are located within 15 or fewer miles? _____

Q9.0 Minimum Services Farmer Expects Retail Suppliers To Maintain

The following questions will be used to determine what services a retail pesticide supplier must have for you to do business with them. Answer with Yes or No.

Would you do business with a supplier that **did not offer**:

Reason		Yes	No
1	Financing	1	0
2	Scouting services	1	0
3	Rental equipment	1	0
4	Delivery of products	1	0
5	Custom application	1	0
6	A full-time salesperson	1	0
7	Offer other products like seed and tractor parts	1	0
8	Are there any other services a dealer must have for you to do business with them (please specify)?		

Q10.0 Farmer Satisfaction With Retail Supplier

On a scale of one to five, with one being not at all satisfied and five being very satisfied, how satisfied are you with your main retail pesticide supplier?

DEMOGRAPHIC INTRODUCTION

I would like for you to answer the following questions, so I can group answers together.

Q11.0 Age

What year were you born? _____

	Yes	No
<i>[If he/she hesitates or refuses:]</i> Are you under 45?	1	0

Q12.0 Education

What is your highest level of education?

[Do not read list. Record only ONE answer.]

- 1 Less than high school diploma or GED
- 2 High School diploma or GED
- 3 Votech
- 4 Some college
- 5 College graduate (bachelor's degree)
- 6 At least some post graduate study

Q13.0 Length of Farming Experience

Since you were eighteen, how many years have you been involved in making farm management decisions?

Q14.0 Location of Primary Area of Operation

In which county is your main area of operation located?

[Do not read list. Record all answers.]

001	Arkansas	
003	Ashley	
017	Chicot	
021	Clay	
031	Craighead	
035	Crittenden	
037	Cross	
041	Desha	
043	Drew	
055	Greene	
063	Independence	
067	Jackson	
069	Jefferson	
075	Lawrence	
077	Lee	
079	Lincoln	
085	Lonoke	
093	Mississippi	
095	Monroe	
107	Phillips	
111	Poinsett	
117	Prairie	
121	Randolph	
123	St. Francis	
145	White	
147	Woodruff	
000	Other (specify) County	State

Q15.0 Number of Acres Farmed

How many acres did you farm in 1996?

Q16.0 Percentage of Land Owned

What percentage of the land farmed in 1996 did you own?

Q17.0 Amount of Acres Planted for Each Crop

	CROP	ACRES
How many acres of _____ did you plant in 1996?	Rice	_____
	Cotton	_____
	Soybeans	_____
	Wheat	_____
	Milo	_____
	Com	_____

Q18.0 Further Comments

	Yes	No
Would you like to receive a summary of the results?	1	0

Do you have any questions for me or anything you would like to add?

Q19.0 Thank you

This concludes our survey. Thank you for your time. The information you have provided will help us to identify what is important to growers when choosing a retail pesticide supplier.

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