ELECTRONIC MARKETING OF HARD RED WINTER WHEAT

By

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HARD RED WINTER WHEAT

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TABLE OF CONTENTS

Chapter Page

Chapter Page

LIST OF TABLES

FIGURE

CHAPTER I

INTRODUCTION

Electronic marketing could improve market efficiency. Potential gains in efficiency include improved buyer and seller communications, improvement in the quality and quantity of market information, reduced costs, and increased competition.

Electronic marketing involves the use of telecommunications and data processing to centralize trading. Thus, facilitating large numbers of buyers and sellers in the trading process (Bell et al.). Electronic marketing can be conducted with the aid of conference telephones, video tape equipment, microcomputers, or computer terminals connected to large (main frame) computers. The primary objectives of electronic markets have been to increase producer's access to potential buyers and to provide reliable and timely market news (Ethridge).

The Grain Electronic Marketing Project

The Grain Electronic Marketing (GEM) project at Oklahoma State University is a cooperative project jointly funded by the Agricultural Marketing Service-USDA and Oklahoma State University. The project consists of three phases: (1) determine the feasibility of an electronic marketing system for wheat, corn, and soybeans and to conceptualize the system; (2) develop computer software and conduct a pilot test; and (3) evaluate the pilot test and make inferences for

commercial development. This study is associated with phase one of the project.

The Problem

A number of studies have expounded the potential for electronic marketing (Bell et al.; Henderson et al.; Russell). However, most of the studies have concentrated on livestock, livestock products, or cotton. Few studies have reviewed the potential for electronic marketing of grains. One study involved interviews with Georgia producers to evaluate attitudes toward electronic marketing. The Georgia study encompassed multiple commodities: corn, soybeans, peanuts, pecans, feeder cattle, and slaughter hogs.

An interview with producers yielded 131 positive and 100 negative attitudes toward electronic marketing. Results indicated that attitudes toward electronic marketing were influenced by the organization and characteristics of the farm, the characteristics and expectations of the farmer, and the attributes of the present and alternative marketing method (Turner et al.).

The void in literature on electronic marketing of grains has occured in spite of the fact grains may be easy to describe (a necessary condition for electronic marketing). Given the theoretical benefits of electronic marketing and the importance of the grain sector to U.S. agriculture, further examination of the potential of electronic marketing of grains was needed.

Objectives

The general objective of this thesis is to determine if wheat

producers and elevator managers perceive a need for electronic marketing. The specific objectives are:

1. Identify characteristics common to successful and to unsuccessful electronic marketing systems.
2. Identify differences between producers' and wheat handling elevators' perceived need for and benefit from an electronic marketing system for grains.

State of the Arts

This section is designed to examine the current marketing process for hard red winter wheat. Characteristics common to electronic marketing systems, the history of electronic marketing, and computerized electronic systems are also reviewed.

Hard Red Winter Wheat Marketing System

The current wheat marketing system is summarized in Figure 1. The primary flow of wheat consists of: (1) producers selling to local elevators, (2) local elevators selling to regional or terminal elevators, and (3) regional or terminal elevators selling to export elevators, flour mills, or feed mills. Producers and local elevators may also sell to a flour or feed mill.

Hard red winter wheat areas typically consist of producers with little on-farm storage, relative to the amount of wheat produced. The majority of the hard red winter wheat is either sold at harvest or stored in commercial warehouses. This is in contrast to corn and soybean producers who typically have larger on-farm storage capacity.

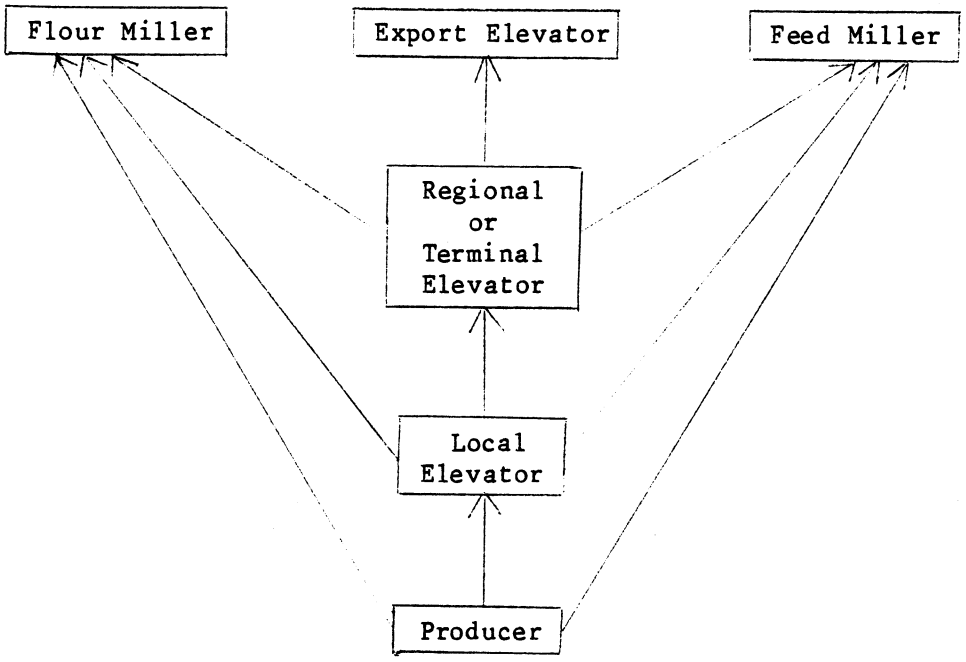

Figure 1. Flow of Wheat

Wheat delivered at harvest is usually liberally graded. Due to the large amount of wheat delivered to the local elevator during harvest, time is a critical factor. In a survey conducted by Miller and Hummer, producers ranked delivery time as a major factor in selecting an elevator.

Each elevator has its own method of grading wheat and applying discounts. Sampling can be done manually or electronically. Some elevators visually inspect each truck and pull a sample only if the load appears not up to standard. A producer's harvest deliveries are averaged with price and discounts applied to the average grade. Wheat delivered to the elevator after harvest is graded by the truckload or an average of all truckloads delivered at that time.

Important grading factors used by local elevators receiving hard red winter wheat include test weight, moisture content, dockage, and foreign material. Foreign material, test weight and moisture are normally considered the most important factors. Numerical grade discounts are applied to wheat not meeting the minimum test weight per bushel required for U.S. grade number two. Cash discounts for U.S. grade number three wheat or lower are applied in compliance with requirements of the local elevator.

At harvest, a cash discount is not typically used for moisture content. A moisture content of 13.5 percent is the official acceptance level. During harvest most elevators will accept, without discount, wheat with a moisture content of 14 percent. Wheat with a moisture content above 14 percent may not be accepted by local elevators. Some elevators will accept test loads of wheat with a moisture content above 14 percent. Most elevators, however, are reluctant to accept any wheat above 14 percent because high moisture wheat can cause hot spots and other related storage problems. To facilitate managing stored wheat, most elevators try to have an average moisture content of 12 to 12.5 percent.

Dockage and foreign material are usually treated in a similar manner. This is typically the case during harvest when there is little time for testing both factors individually. Discounts are applied to either excess dockage or excess foreign material, but not both. Numerical grade discounts are applied for dockage or foreign material in excess of one percent. Elevators may also discount by paying actual test weight with dockage included. Dockage and foreign material cause wheat to have a lower test weight. Grade discounts used by local

elevators are normally consistent with the discounts used by regional elevators and mills.

Wheat is priced as U.S. grade number one with discounts applied to U.S. grade number three or lower. Prices paid to producers by the local elevator may be based on a bid price FOB a delivery point minus freight, handling and profit margin. Prices may also be based on the futures market price adjusted for expected basis and margin.

Wheat bought and sold at levels after the local level are based on official U.S. grades and standards with published premiums and discounts. Actual grading may be conducted by a qualified third party or the Federal Grain Inspection Service.

The majority of grain trades are made via the telephone. Price quotes can be in price per bushel. However, bids are normally based on the Kansas City Board of Trade wheat futures contract adjusted by the Gulf basis (Gulf price minus Kansas City futures price).

Most price quotes are also obtained via telephone. But, cooperative elevators have access to Union Equity Cooperative Exchange's and Far-Mar-Co's bids via a video terminal. Trades are made via telephone with written confirmations.

General

An element of locational monopoly may exist in agricultural marketing systems (Schlei, 1980). Economies of scale may exist for grain dealers who sell larger quantities to take advantage of special rates and a stronger bargaining position. Due to economies of scale at any one location, only enough wheat may be produced to support one or two elevators. Thus, reducing competitive pricing.

Introduction of electronic markets would separate two distinct but often combined marketing functions: negotiating the trade, and physical transfer of the product from seller to buyer (Henderson et al., 1976). Through the use of modern technology, the former is centralized and the latter decentralized. No longer would it be necessary for the buyers, sellers, and product to be physically present at the same location to facilitate a sale. Centralization of sales would occur electronically with the product being sold by description. Physical transfer of the product would be decentralized. Farm products would remain on the farm until the sale arrangements were completed and the price established. Electronic markets would have to accomodate title transfer, transportation needs, payment, and other details related to physical delivery of the products (Ward and Russell, 1984).

Separation of trade negotiation and physical transfer of the product have been important aspects for electronic marketing of livestock. This is not necessarily the case for wheat. Wheat is currently being sold by description. Exceptions to this may occur between the producer and local elevator, but beyond that stage, it is sold by description.

Characteristics

For electronic markets to be successful, five characteristics must exist (Henderson, 1982). The first characteristic is organized trading. There must be a set of behavior rules which apply to all participants. These rules must be known and enforceable. Secondly, centralization of sales negotiation by a single entity is required. The electronic mechanism must be able to manage communications among a

large number of market participants (buyers and sellers) simultaneously. The third characteristic is remote market access so that neither buyers nor sellers need to be physically present at one location. The fourth characteristic is that commodities would be marketed based on descriptions that are clear and meaningful to all market participants. Last, post-sale shipment must exist, where sellers would maintain physical control over their products until sold. Delivery dates can also be negotiated so that electronic markets can have both spot and forward delivery characteristics.

History

The first successful electronic market began by selling slaughter hogs in Ontario, Canada in 1961. The system used a teletype communication network (Peer). Hogs were marketed using a descending bid, or "Dutch" auction. The descending bid is most compatible with the teletype system. Due to lack of familiarity with the descending bid auction procedure, U.S. traders have shown reluctance in the support of a teletype system for electronic trading (Henderson, 1982). The Ontario hog marketing system continues to be successful. It has become the pricing basis for hogs throughout Canada and is responsible for pricing virtually 100 percent of the slaughter hogs sold in Ontario over an electronic exchange (Henderson, 1979).

The first electronic marketing system in the United States was a telephone auction for slaughter hogs in Virginia in 1962. Telephone auctions, or teleauctions were used because they are relatively simple and cost efficient. Marketing slaughter hogs by teleauction proved unsuccessful because of insufficient volume and an inability to

satisfactorily describe hogs (Ward, October, 1980). Teleauctions have been successful in the marketing of feeder pigs and slaughter lambs. They continue to be successful, but potential exists for teleauction users to convert to other marketing techniques (i.e. computerized electronic marketing).

The major types of electronic trading systems are manual trading systems, telephone auctions, video auctions, and computerized trading systems. According to Schlei (July, 1983), all of these variations follow the same general format with two-way telecommunication between buyer and seller.

Commodities are sold by description based on pre-determined grades. Similar products can be comingled into truckload or carload lots prior to being offered for sale, or comingling can be done on "paper" with actual assembly after the sale. Price can be determined by auction or a firm offer price can be stated. Shipping arrangements are made after the sale is negotiated.

The manual trading system is operated through a clearinghouse. Commodities with defined grades are bought and sold through offers made by telephone. The offers to buy or sell are manually matched. Manual trading systems (telephone clearinghouses) have been used in marketing eggs since 1971 (Ethridge, 1978). Another form of manual trading includes buying or selling through a broker. A seller of grain might inform his broker of what he wishes to sell. The broker would then locate potential buyers over the telephone.

Telephone auctions, or teleauctions, are auctions conducted over a conference telephone. In a teleauction, commodities, buyers, and auctioneer can be at separate locations. A conference telephone can

enable buyers and the auctioneer to communicate with each other (Ward, October, 1980). The auctioneer announces successfully higher bids as long as buyers on the conference call continue to bid. Buyers can choose any delivery date within a specified period, and sellers can elect a "No Sale" or minimum acceptable price (Henderson et al., 1976). Teleauctions have the advantages of utilizing readily available equipment and low development costs. However, trading is relatively slow and conference telephone arrangements are often unreliable. Local or regional livestock teleauctions are popular in many parts of the U.S., mostly for feeder pigs and market lambs (Henderson, 1982).

Video auctions have primarily been used for feeder cattle, but have also been used for slaughter cattle, feeder lambs, breeding sheep, and breeding cattle. In video auctions, the buyers view video tapes rather than physically seeing the product (Bell et al., 1983). This reduces marketing cost for producers. Transportation cost and risks of weight loss and injury during transportation are reduced. A potentially larger number of buyers may be assembled. Verbal descriptions of the livestock including number for sale, sex, estimated weight, grades, and location, are included on the video tapes. The auctioneer initiates the auction, and then the livestock are sold to the highest bidder. After the video auction, cattle are moved from the seller's ranch to the buyer's location (Ward, 1983).

The fourth major type of electronic trading system is the computerized trading system. The computerized system is the most technically sophisticated of the four types of electronic markets. Variation exists between computer systems, but all systems process

information and provide a communication medium between buyers and sellers.

Computerized Electronic Marketing Systems

Research supports the hypothesis that computerized sales may offer some price advantage when compared to teleauctions (Russell and Ward, 1982). The computerized system has the capacity to handle a larger number of transactions per hour, execute them automatically, and complete a number of bookkeeping routines.

A computerized system can receive, process, store, retrieve, and send information. These functions can be accomplished with speed and accuracy. Computer systems have larger fixed costs and smaller variable costs of operation than teleauction or teletype, resulting in very low per-unit costs with high volume trading (Engelman et al.). The computerized system could also provide other services. These services might include market analysis, word processing, bookkeeping, or distribution of market news or other desired information.

There have been six computerized agricultural commodities trading systems in the U.S. These trading systems include the Egg Clearinghouse (ECI), Telcot, the Cattle Exchange (CATTLEX), the Hog Accelerated Marketing System (HAMS), the American Meat Exchange's Computer Assisted Trading System (CATS), and the National Electronic Marketing Association (NEMA). Only Telcot was developed entirely with private funding. The two oldest, Telcot and ECI, were developed commercially. The others were pilot projects funded by the USDA.

To facilitate telephone offers of and bids for "nest run" eggs, the Egg Clearinghouse, Inc. (ECI) was organized in 1971. Before 1978,

ECI manually matched trades between buyers and sellers. In 1978, ECI began computerized trading. Fifty-five terminals were installed for use by buyers and sellers. The system was developed with support from Purdue University and the Agricultural Marketing Service (AMS)/USDA funding.

Participants in ECI have used the system to evaluate trading alternatives (Bell et al.). Sellers have shown a tendency to accept only higher prices on the computer system and to take relatively lower prices in private. Information about these private trades is not available to ECI; consequently their success in providing market information based on negotiated trades has been limited (Bell et al.). ECI is still functioning.

In 1975, the Plains Cotton Cooperative Association of Lubbock, Texas, began selling cotton through a network of computer terminals. This was the first computerized spot commodity market. Telcot is successful because it meets the necessary conditions for an electronic remote-trading system: (1) organized trading, (2) centralization of sales by a single entity, (3) remote market access, (4) a descriptive and widely accepted grading system, and (5) post-sale shipment. A sufficient volume traded has resulted in a cost efficient and successful system.

No attempt to quantify the market impacts of Telcot has been made. It is possible, however, that Telcot has not affected the average producer price but has reduced the variation of prices received among the producers for cotton of the same quality (Ethridge).

CATTLEX was designed to operate as a remote-access cash market for feeder cattle (Sporleder and Davis). It was developed at Texas A&M

University under an AMS/USDA-funded project. CATTLEX was pilot-tested from September 1980, through November 1981. The primary objective was to test a description system. Modifications of CATTLEX are being made by a Texas firm and a commercial test is likely (Bell et al.).

HAMS was a sophisticated electronic marketing system used daily from November 10, 1980 through June 12, 1981 to trade slaughter hogs. It was developed jointly by Ohio State University, Producers Livestock Association (which is a regional marketing cooperative) and Ohio Department of Agriculture with partial funding by the U.S. Department of Agriculture. The project objectives included conducting daily sales for 31 weeks. Sales were to continue beyond that period only if there was clear evidence that the system could become self-supporting in subsequent months (Henderson and Baldwin). Due to insufficient volume, HAMS was not cost competitive with alternative marketing methods available to sellers.

The Computer-Assisted Trading System, CATS, was an electronic marketing system for trading meat at the wholesale level. In 1981, a pilot-test and evaluation was conducted by the University of Illinois' Agricultural Experiment Station with funds provided from the AMS. The system was developed by the American Meat Exchange (AME), with assistance provided by the General Electric Information Services Company (GEISCO), a subsidiary of General Electric. CATS was a computer-assisted, not a computerized trading system. The computer was used as a communication facility and negotiations are conducted by traders rather than the computer (Sarhan and Nelson). CATS was unsuccessful primarily because it did not have the support of the meat

industry. There were an insufficient number of traders to make the system economically feasible.

The Electronic Marketing Association was organized in 1980 by Virginia Polytechnic Institute and State University and the Virginia Department of Agriculture and Consumer Services. Partial funding was provided by AMS/USDA. EMA was established as a computerized auction system for market lambs and slaughter cows. Presently, trades include lambs, hogs, and feeder cattle.

The Electronic Marketing Association was reorganized as the National Electronic Marketing Association (NEMA) in October 1982. NEMA's computerized auction is a remote-access time-sharing system. NEMA buys computer time from Computer Sciences Corporation (CSC) and uses CSC's communication network (Russell and Purcell, 1983). A study by Russell indicated a highly significant increase in slaughter lamb prices relative to the national and regional prices after initiation of electronic trading. Russell also found that changes in prices of regular auction lamb sales tended to lag changes in the electronic auction by one week (Russell).

HAMS, CATTLEX, and CATS are currently not operating on either a commercial or demonstrational basis. The lack of sufficient trading volume was considered the major reason for termination of those projects. It is not clear that two commercial systems, ECI and NEMA, have achieved sufficient trading volumes to assure an adequate profit for long term viability (Henderson, 1984). Since the use of computers in the marketing of agricultural products is relatively new, there is potential to expand into other areas of agriculture.

Theory

The economic theory on which this study was based includes theory of thin markets, and the theory of pricing and technical efficiency. Electronic marketing has the potential to eliminate or reduce spatial imperfections and pricing problems present in thin markets (Russell and Purcell, 1980). The potential to increase both technical and pricing efficiency also exists with electronic marketing.

Thin Markets

The term "thin markets" is used to describe markets with little trading volume and liquidity (Hayenga et al.). Schlei states that with few potential buyers and sellers, it becomes difficult to sell without driving the price down, or to buy without causing prices to rise. Prices on thin markets are often erratic and may not represent the true value of the product. As individual traders discover that they can affect the market price by offers to buy or sell, prices established on thin markets may be subject to manipulation. Electronic marketing may evolve as an attempt to abolish thin markets and to increase market efficiency (Hayenga et al.).

In a static or single-period context, a market can be thin because of a limited number of transactors on one or both sides of the market (Caves). Thin markets in the grain industry may exist because of location, whereby a producer may have only one reasonable choice in which to sell his grain. Due to the location of his operation, it may not be economically feasible to sell his grain to other distant outlets.

Thin markets have been prevalent in the egg and broiler markets, butter and cheese markets, livestock and meat markets, and fruit and vegetable markets. Increases in usage of formula trading for these commodities has been suggested as the primary cause of thin markets. These "thin" markets may also be the result of vertical integration and longer term contractual arrangements (Hayenga et al.). Thin markets do not appear to be a major problem in the grain industry.

Efficiency

Electronic marketing may have the potential to improve technical and price efficiency. Technical efficiency is related to the costs of accomplishing basic marketing functions--assembly, processing, storage, distribution, etc. Price efficiency is related to how effectively prices and price signals allocate commodities among buyers and sellers. Price efficiency may depend on how fast and accurately markets evaluate pricing information and how accurately the information is transmitted to buyers and sellers (Ethridge).

Helmreich and Epperson state that increased technical efficiency could result from:

1. less traveling expense for buyers due to a decreased amount of commodity hauling, and
2. eliminated duplicity of treating or handling commodities.

Increased pricing efficiency could result from:

1. more buyers,
2. increased market information,
3. increased accuracy and reliability of information,
4. a balancing of market power between buyers and sellers, and

5. more accurate description allowing buyers to articulate their demands for particular commodity characteristics better.

Due to centralization of trading without the necessary movement of buyers, sellers and/or products to a common location, technical efficiency may increase for some agricultural commodities (Henderson, 1982). Wheat is ordinarily traded over the telephone or hedged on the futures market and is seldom shipped until the buyer is known and the delivery point has been decided. For this reason, increased technical efficiency may not be possible for wheat.

Principal benefits to the grain industry from electronic marketing may be in the form of increased pricing efficiency. Price behavior may be altered because of greater competition, improved information, and expanded market access. Prices tend to be more responsive to short-run changes in market conditions and are thus more accurate reflections of true market-determined values (Henderson, 1982). Because of insufficient volume, a low number of buyers and/or sellers, lack of confidence in the system, or organizational flaws, an electronic system, originally, might not be as price efficient as the present marketing system (Russell).

CHAPTER II

STATISTICAL METHODS OF ANALYSIS

The general objective of this thesis is to determine if wheat producers and elevator managers perceive a need for electronic marketing. An attempt is also made to identify who might benefit from an electronic marketing system for grains. Statistical tests will be used to analyze answers to questions concerning electronic marketing.

A t-test will be used to determine whether a statistical difference exists between responses of an interview and a mailed producer survey. If no statistically significant difference exists among a predetermined number of questions, it will be assumed the two samples are from the same population and the two surveys will be combined. A t-test will also be used to explain whether or not it is statistically viable to combine the officer and director survey with the federally inspected warehouse manager survey.

Further analysis will involve comparisons of the wheat producer group with the elevator group. Statistical tests between producers and elevators involve use of a chi-square. Chi-square is a test of association. Use of this test will determine the probability that producers responded in the same manner as elevators.

Independent Samples

Tests on independent samples, as opposed to paired samples, are

used to compare means of two populations in which a sample from each has been drawn independently. With paired samples, similar individuals or things are selected. One treatment is applied to one member of each pair, the other treatment to the second member.

Producer surveys were sent to two different samples. One was sent to a random sample of all wheat producers in Oklahoma and Kansas. The other was confined to a specific geographic location. This location was not randomly selected, but consisted of the two highest wheat producing counties in Oklahoma and Kansas. Elevator surveys were also mailed to two different samples. One was a random sample of all federally inspected warehouses. The other consisted of officers and directors of state grain and feed associations who may or may not be elevator managers.

Tests concerning significant differences between samples are based on the t-distribution. The t-distribution is a comparison of means and standard deviations. This study consists of two independent samples with means $\bar{x}_1$, $\bar{x}_2$ which are estimates of their respective population means. It is assumed that $\bar{x}_1$ and $\bar{x}_2$ for the two producer surveys and the two elevator surveys are normally distributed and are independent.

Test for Equality of Variances

When SAS is used to compare two samples, a separate t-value is given for equal and unequal variances. Snedecor and Cochran list common situations in which unequal variances occur:

1. When the samples come from populations of different types, as in comparisons made from survey data.

2. When computing confidence limits in cases in which the population means are obviously different.
3. When one treatment is erratic in its performance, sometimes giving a high and sometimes a low response.

When t-tests are used, it is assumed that the sample variances are equal. Since our data was derived from populations of different types, this assumption will be avoided. Statistical tests are made to determine whether or not the variances are equal. The assumption is also made that responses are nomally distributed. In order for t-tests to be valid, it must be assumed that errors are normally distributed around the mean and the sum of the errors equal zero.

Two sets of sample values are compared. The null hypothesis is: s_1^2 and s_2^2 are from independent random samples from normal populations with the same variance. A significance level of five percent will be used for all statistical tests. A five percent significance level is recommended by Cochran when conducting a chi-square test from finite sample sizes (Roscoe and Byars).

Estimates of the population variance for each sample is calculated separately. The F-statistic is a ratio of two variances and is used when a test for equality of two variances is being made.

$$F = \frac{\text{larger of } s_1^2, s_2^2}{\text{smaller of } s_1^2, s_2^2}$$

Degrees of freedom for F are (n_1-1) and (n_2-1), where n_1 and n_2 are the sample sizes. This calculated F-value is compared with a tabled F-value $(F_{.025,n_1-1,n_2-1})$. If the observed $F>F_{.025}$, the null hypothesis

is rejected at the five percent level and it can be concluded that the sample variances are significantly different (unequal). If the observed $F<F_{.025}$, we fail to reject the null hypothesis and conclude that no significant difference exists between the two sample variances.

T-Statistic

The t-test is a statistical test for determining if a difference exists between two sample means. This distribution, sometimes referred to under the pseudonym "Student", is most effective when used to compare small samples. It is used in this analysis as a statistical test to determine if you can combine two small samples. The null hypothesis is: no significant difference exists between the means of two samples. If no statistical difference exists, then the conclusion can be drawn that the two samples come from the same population. If this is determined, one large sample will be used for further analysis.

Combining of Producer Surveys

Interviewed producers answered the survey on a scale of 1-100. Responses to the mailed producer survey, however, was coded on a scale of 1-5. Before a t-test can be used, the responses had to be converted to the same scale.

To convert responses of the interview survey (1-100) to a 1-5 scale, some assumptions are made. First, it is assumed that persons interviewed were rational and capable of answering in a range of 1-100. Secondly, it is assumed that the responses produce interval level data. Interval scales approach the man-on-the-street's conception of measurement in that an interval scale does possess a constant unit of

measurement. Interval scales permit one to make meaningful statements about the difference separating two objects.

The scale for comparison of producer samples is as follows:

1- 20 = 1 = not important; no need; strongly disagree

21- 40 = 2 = less than moderately important; less than moderate need; disagree

41- 60 = 3 = moderately important; moderate need; uncertain or no opinion

61- 80 = 4 = greater than moderately important; greater than moderate need; agree

81-100 = 5 = highly important; great need; strongly agree

This allows for the responses of the interview survey and the mail-out survey to be on the same scale so that computer comparisons can be made. The 1-5 scale also applies to responses of the elevator surveys.

Comparison of Two Sample Means, Unequal Sized Samples, Equal Variances

The t-statistic for testing the equality of means from two independent samples when variances are equal for n_1 and n_2 observations is:

$$t = (\bar{x}_1 - \bar{x}_2)/\sqrt{s^2(1/n_1 + 1/n_2)}$$

This t-value includes a term for the pooled variance s^2. The pooled variance is:

$$s^2 = \{(n_1-1)s_1^2 + (n_2-1)s_2^2\}/(n_1 + n_2 - 2)$$

where s_1^2 and s_2^2 are the variances of the two groups. The degrees of freedom for samples with equal variances is (n_1+n_2-2).

The calculated t-value is compared with the tabulated t-value at the five percent significance level with (n_1+n_2-2) degrees of freedom. If the calculated t-value is less than the tabulated t-value, the null hypothesis is not rejected. It is then concluded that no significant difference exists between the means and variances of the two samples.

Comparison of Two Sample Means, Unequal Sized Samples, Unequal Variances

The t-statistic for testing the equality of means from two independent samples when variances are unequal for n_1 and n_2 observations is:

$$t' = (\bar{x}_1-\bar{x}_2)/ (s_1^2/n_1+ s_2^2/n_2)$$

This quantity does not follow student's t-distribution. Since the tabulated t-value ordinarily assumes that population variances are equal, the t-value for unequal variances requires a special table. Two different forms of this table for t'-values with unequal variances have been designed, one by Behrens and Fisher, and the other by Welch and Aspin.

According to Satterthwaite, the ordinary t-table may be used with the following approximation for degrees of freedom (df):

$$df = \frac{(s_1^2/n_1 + s_2^2/n_2)^2}{(s_1^2/n_1)^2/(n_1-1) + (s_2^2/n_2)^2/(n_2-1)}$$

This approximation, which is also used by SAS, assigns an approximate number of degrees of freedom to t'. It is slightly more conservative than the Behrens-Fisher and Welch-Aspin solutions, but it has proven to be sufficiently accurate (Snedecor and Cochran).

Once the calculated t'-value has been derived, it is compared with the tabulated t-value at the five percent significance level with the degrees of freedom determined from Satterthwaite's formula. If the calculated t' is less than the tabulated t, the null hypothesis is not rejected. It is then concluded that no significant difference exists between the means and the variances of the two samples.

Combining of Surveys

The t statistic can be used to determine if a significant difference exists between means. The researcher must decide the probability levels for accepting or rejecting the null hypothesis that the samples are from the same population (Greensted et al.). In this study, a significance level of five percent is chosen. A t-value above 2.0 or a p-value less than .05 are considered statistically significant. The p-value or Prob > |T| gives the probability that the t-value between samples will be nonsignificant. If 90 percent of the compared mean responses are considered not significantly different, results from the two producer or two elevator surveys will be combined.

Chi-Square

Chi-square can be used as a quantitative test of the difference between the observed (f_i) and the expected (F_i) frequencies in a comparison. The null hypothesis is: no significant difference exists

between an observed set of frequencies and a theoretically expected set of frequencies. Normality is not assumed, which means there is a possibility that standard deviations may be skewed.

Data are divided into two classes: producers and elevators. Responses of producers and elevators are divided into five intervals:

1 = not important; no need; strongly disagree

2 = less than moderately important; less than moderate need; disagree

3 = moderately important; moderate need; uncertain or no opinion

4 = greater than moderately important; greater than moderate need; agree

5 = highly important; great need; strongly agree

A 2X5 contingency table is used to derive the chi-square statistic. A contingency table is simply a table that displays how two or more characteristics are related. The formula for the chi-squared statistic is equal to:

$$\text{chi-square} = \sum_{i=1}^{k} \frac{(f_i - F_i)}{F_i}$$

Where:

f_i = observed frequency;

F_i = expected frequency {(row total)(column total)/(grand total)}; and

k = number of cells.

The degrees of freedom are (R-1)(C-1), where R,C are the numbers of rows and columns, respectively.

Chi-square tests of goodness-of-fit and of independence are approximations of the multinomial probability distribution as the sample size approaches infinity. The nature of the approximation with finite sample sizes is difficult to investigate mathematically (Roscoe and Byars).

When using SAS and a finite sample size to derive a chi-square value, response skewness can cause a warning. The warning appears whenever at least 20 percent of the cells have expected counts of less than five. Intent of the warning is to alert users that chi-squared values computed from those cells may inflate the overall chi-squared count. Thus indicating statistical significance when none would otherwise exist. The problem normally appears with small sample sizes.

Cochran draws a tentative conclusion to the problem of limited sample size. He indicates the approximation may be acceptable if all expected frequencies are small but at least equal to two. Cochran indicated that the Chi-Square approximation is acceptable if the true probability falls within 0.04 to 0.06 for the 0.05 tabular value (Roscoe and Byars). If producer and elevator surveys can be combined and Cochran's results are used, sample size should not be a problem.

Comparison of Producer and Elevator Surveys

The objective is to determine whether producer responses are different from elevator responses. The chi-square test will indicate whether or not a perceived mutual need for electronic marketing exists. A perceived mutual benefit from an electronic marketing system will also be examined. If a mutual need and/or benefit does not exist, differences between the two groups will be identified.

CHAPTER III

SURVEYS AND PROCEDURE FOR ANALYSIS

Data for this study was gathered by surveying hard red winter wheat producers and elevators. There were two producer and two elevator surveys. A t-test was used to determine whether responses from the two producer and two elevator surveys could be combined. By doing this, comparisons between producer and elevator responses can be made.

Surveys

Producer Surveys

Two producer surveys were conducted. The first survey was a personal interview. A random sample of grain producers within the top grain producing counties in Oklahoma, Kansas, Nebraska, Iowa, Missouri, and Arkansas were selected. In this study, Oklahoma, Kansas, and Nebraska wheat producer responses were sorted, thus segregating hard red winter wheat producers. A copy of the interview survey with summary statistics can be found in Appendix A. The second survey was mailed to a random sample of wheat producers in Oklahoma and Kansas. This survey concentrated on electronic marketing. A copy of the mail survey with summary statistics can be found in Appendix B.

Grain Elevator Surveys

There were two grain elevator surveys. One was mailed to a random sample of federally inspected warehouse managers (FIW) west of the Mississippi River. A copy of the FIW survey with summary statistics can be found in Appendix D. The other elevator survey was sent to all officers and directors (O&D) of state grain and feed associations west of the Mississippi River. The O&D survey included questions not covered in the FIW survey (primarily concerning current marketing practices and objectives). A copy of the O&D survey with summary statistics can be found in Appendix E. Responses from Kansas, Oklahoma, South Dakota, Montana, Colorado, Nebraska, and Texas were used in this study.

Sampling Procedure

Sample Selection

A consistent list of producers could not be obtained at a reasonable cost. Thus, an alternate method was selected. First, the two highest wheat producing counties in Oklahoma and Kansas, the two highest corn and soybean producing counties in Nebraska and Iowa, and the two highest soybean producing counties in Missouri and Arkansas were selected. The hard wheat producing counties surveyed included: Garfield and Grant counties in Oklahoma; Harper and Sumner counties in Kansas; and York and Hamilton counties in Nebraska.

A minimum of 25 producers in each state were surveyed. One-half of this 25 came from each of the two survey counties. Once the survey counties were selected, they were divided into four mile square blocks.

One block was chosen to survey along with three alternate blocks. An effort was made to survey all producers within the block, or until a minimum of 12 or 13 producers had been surveyed.

The mail survey was sent to a random sample of wheat producers in Oklahoma and Kansas. Names and addresses of the wheat producers were provided by the Oklahoma and Kansas Wheat Commissions. Six-hundred wheat producers in Oklahoma and Kansas were mailed surveys (three-hundred producers in each state). The goal from the mailed producer survey was to validate results from the interview survey and provide a larger sample of wheat producers.

A list of state grain and feed association officers and directors was obtained. Each officer and director was mailed a copy of the survey. Lists of officers and directors were obtained from the state grain and feed associations. A total of 225 O&D surveys were mailed.

From a list of federally inspected grain warehouses, every ninth elevator was selected. Six-hundred and twelve out of approximately 5,320 federally inspected warehouses west of the Mississippi River were mailed surveys.

Response

A total of 150 producers (25 in each of the 6 participant states) were interviewed. Fifty-four were hard wheat producers. Six-hundred producer surveys were mailed (300 in Oklahoma and 300 in Kansas). Of these, a total of 72 responded.

There were 48 respondents (out of 225 mailed) for the officer and director survey. Of these, 25 were wheat handlers. There were 612

mailed federally inspected warehouse surveys. Out of these, 118 elevators responded (50 handled wheat).

Follow-up

Due to a low producer response rate, a follow-up survey was conducted for the mailed producer survey. The follow-up included an additional copy of the survey and a cover letter to determine more about the population from which the sample was drawn. Survey responses from the follow-up were combined with the first mailing for analysis. One-hundred and thirty-eight people checked one of the responses on the cover letter. Some checked more than one response causing the total number of responses to be greater than 138. A copy of the cover letter with summary statistics can be found in Appendix C.

A follow-up was also conducted for the officer and director survey, and the federally inspected warehouse survey. An identical copy of the survey was mailed to all of those who did not respond to the first mailing. A cover letter to encourage response was also included. Survey responses from the follow-up were combined with the first mailing for analysis.

Comparison of Two Samples

To evaluate the differences between the producer interview survey and the mailed producer survey, a t-test was performed. This type of test was used to statistically determine whether the two groups were from the same population. A t-test was also performed between the officers and directors survey and the federally inspected warehouse survey.

Survey Inconsistencies

Inconsistencies between the two producer surveys may lead to biased results. Some questions were worded differently. For instance, "the ability to offer grain at a set price and wait until a buyer bids that amount" (question 5.a. of the mailed producer survey in Appendix B) is an abbreviated form of "producers could offer their grain at a set price and wait until a buyer bid that amount" (question 4.a. in section IV of the personal interview survey in Appendix A).

Three interviewers conducted the survey. Two interviewers were female and one was male. Differences in personalities and communication skills may have influenced producers to interpret the questions in different ways.

Another source of inconsistency with the producer survey may lie with sample location. The personal interview was restricted to the two top wheat producing counties, while the mailed survey was a sample of all land owners with wheat bases. An outdated list of producers may have also caused the response rate to be lower than might have occurred if a more updated list had been accessible.

Inconsistencies between the two elevator surveys also existed. Officers and directors of the state grain and feed associations ordinarily are the more active participants in the grain industry. They may have a higher degree of education, be better informed, and have more access to technically advanced systems. These reasons may cause the officers and directors to have a higher comprehension of an electronic marketing system than the average elevator manager.

Another potential cause of divergence in both producer and elevator responses might simply be because of the different survey

lengths. Those answering the longer surveys may have been more reluctant to fill them out. They may have also answered the questions more hastily and with less thought.

Furthermore, biased results may exist because of inconsistencies between producer and elevator surveys. The wording of similar questions contained within the two surveys presents a major inconsistency. This can be exemplified by "the ability to offer grain at a set price and wait until a buyer bid that amount" (question 5.a. of the mailed producer survey in Appendix B) compared with "the ability to bid on grain based on producers asking price" (question 23.b. of the officer and director survey in Appendix E).

Combining Producer Surveys

Producers were asked whether a need for electronic marketing of grains existed. The response mean of the interview survey was 3.57 compared with a response mean of 3.43 from the mailed survey. The scale for analysis of this question and following questions is given in the methodology chapter. With a t-value of .77, the null hypothesis is not rejected.

Seven questions pertained to the importance of pricing characteristics. These characteristics included the ability to: 1) offer grain at a set price and wait until a buyer bids that amount, 2) forward contract grain at a set price and wait until a buyer bids that amount, 3) have grain auctioned to the highest bidder, 4) place a reservation or floor price (unknown to buyers) on your grain, 5) frequently change your reservation or floor price, 6) place futures market orders, and 7) offer grain to more buyers.

One question was significantly different between producer surveys. The question asked the importance of offering grain to more buyers. The t-value was -2.27 and the Prob > |T| was .03. A t-value of less than 2.00 with a Prob > |T| of .05 or higher was preferred. The t-test indicated a statistically significant difference between the two groups. The response mean of the interview survey for this question was 4.17 with a standard deviation of 1.11. A response mean of 4.57 with a standard deviation of .76 was derived from the mailed survey.

Both response groups thought the ability to offer grain to more buyers was greater than moderate to highly important. The difference between the responses, however, was large enough to prevent concluding that the two groups were from the same population. Results indicated that producers who responded to the mailed survey were more interested in the potential of offering grain to more buyers. Since the interview survey was centered around high production counties in Oklahoma and Kansas, those producers interviewed may have more bargaining power than the average wheat producer. They may have developed marketing alternatives and may have access to larger terminal elevators. Above average competition between elevators may exist in these counties. Also, elevators may provide services which satisfy producers needs and discourage them from selling grain elsewhere.

Questions were asked concerning the importance of information services offered by an electronic marketing system. Potential information services included: 1) improved access to details of the most recent trades, 2) improved access to summaries of all trades, 3) improved access to cash price bids from buyers, 4) improved access

to forward contract bids from buyers, and 5) improved access to other market information.

The ability to upgrade current market information is a service important to most producers. No statistical difference existed between responses of the two surveys. Updated and current information could help make short-run or immediate decisions. Producers would be aware of prices offered, current transactions taking place, and conditions that might cause prices to change. Longer range planning decisions could be made by staying abreast of current events, USDA reports, or other market information that might aid in market analysis by the producer.

A section concerning the importance of selling grain based on descriptive characteristics (i.e. location, moisture, protein, etc.) was included. This section included 13 characteristics. No significant difference existed between responses of the two survey groups.

Four questions involved the importance of potential storage and transportation information. These questions included the ability to: 1) locate available storage for grain, 2) offer grain to elevators for a set storage fee, 3) locate transportation for moving grain, and 4) negotiate freight rates. There was no significant difference between responses of the two wheat producer groups surveyed.

Potential operational characteristics available through an electronic market were examined. This section included questions on how important it is to: 1) market grain knowing that buyer performance is guaranteed, 2) access the trading system from your home, 3) access

the trading system from a local agribusiness, 4) send and receive electronic mail, and 5) use the computers for other consumer services.

Two operational charactaristics had a statistically different response between producer groups. One question asked the importance of accessing the trading system from your home (with a telephone and computer terminal or microcomputer). A t-value of 2.37 and a Prob > |T| of .02 was derived between the two samples. A response mean of 4.24 with a standard deviation of .97 was calculated from the interview survey. This is compared with a response mean of 3.81 with a standard deviation of 1.06 from the mailed survey. Both means were relatively high.

Producers from the high production counties may see a greater need for personal ownership of a computerized system. That need extends beyond use as a trading system (i.e. farm records, information system, market analysis, etc.). This is verified by the second operational charactaristic with a significant difference between responses. A t-value of 2.29 with a Prob > |T| of .02 was calculated for responses to the importance of being able to use computers for other consumer services (airline reservations, catalog shopping, etc.). Producers from the interview survey gave a response mean of 3.48 with a standard deviation of 1.41. This is compared to a response mean of 3.15 with a standard deviation of 1.17 calculated from the mailed survey. Once again, responses from the producer groups were empirically similar, but the differences between responses were statistically significant.

Producers were asked the extent to which they agreed grain and transportation services would be bought and sold through a computerized trading system within five years. Questions were also asked about the

perceived use of a computerized trading and information system. There was no statistically significant difference between responses of the producer groups.

Conclusions For Combining Producer Surveys

The t statistic is used to estimate differences between means of two samples. Three of the 49 characteristics on electronic marketing yielded a t-value indicating significant difference between the two samples. These three characteristics, however, did not exhibit a large empirical difference. No cut and dry formula exists for determining whether the magnitude or occurance of differences warrent action for not combining samples. It was stated earlier that if 90 percent of the questions analyzed are considered nonsignificant (at the five percent significance level), the two producer surveys will be combined. The combined results will be compared with the elevator survey.

Combining Elevator Surveys

The officer and director survey responses were compared with the elevator managers survey responses to determine whether a statistical difference existed. These responses were coded using the same response scale as the mailed producer survey.

Both elevator groups were asked whether a need for electronic marketing of grains existed. A t-value of 2.75 with a Prob > |T| of .01 was calculated. This indicated that at the five percent significance level, a statistically significant difference between responses existed. The officers and directors response mean was 2.25

with a standard deviation of .94. This is compared with a response mean of 2.96 and standard deviation of 1.07 from elevator responses.

None of the officers and directors surveyed foresaw a great need for electronic marketing. Elevator managers indicated a moderate need for electronic marketing.

Six questions were asked to determine the importance of potential pricing characteristics used in electronic marketing. Those characteristics included: 1) expanded information about quantities of grain offered at specified prices, 2) ability to bid on grain based on producers' asking prices, 3) expanded procurement area, 4) expanded sales area, 5) ability to participate in periodic grain auctions, and 6) ability to frequently change bid or offer prices. There was no significant difference between the two elevator groups.

A section of questions was included to determine the importance of improved information services. This section asked the importance of improved access to: 1) details of current sales or purchases, 2) summaries of all sales and purchases, 3) forward contract offers from producers, 4) information about available storage facilities, and 5) other market information. No statistically significant difference existed between the responses of officers and directors and elevator managers. Most elevators agree that updated and expanded information services were moderately important to greater than moderately important.

The importance of potential operational characteristics available through electronic marketing was examined. These characteristics included the ability to: 1) market grain knowing that seller performance is guaranteed, 2) send and receive electronic mail, and

3) use the computers for other consumer services (airline reservations, catalog shipping, etc.). There was no significant difference between responses of the two elevator groups. The importance of the ability to buy grain described by an independent third party was asked on the officer and director survey, but was deleted from the elevator manager survey. Officers and directors response mean was 3.08. Thus, they thought this was moderately important.

Potential transportation services were analyzed. These services included the ability to: 1) locate truck transportation, 2) locate rail transportation, 3) locate barge transportation, and 4) negotiate freight rates. No significant difference existed between responses of the two elevator groups.

One necessary characteristic for electronic marketing is that commodities are marketed based on description. A section included descriptive characteristics (i.e. location, moisture, protein, etc.) that would be used by merchandisers when buying or selling wheat. Thirteen characteristics were covered. There was no statistically significant difference between responses of the two elevator groups relative to the characteristics.

Elevators were asked the extent to which they agreed that: grain and transportation services would be bought and sold through a computerized trading system within five years, local elevators would use a computerized information or trading system, inland terminal or subterminal elevators would use a computerized information or trading system, and export elevators would use a computerized information or trading system. Personal use of a computerized information or trading system was also examined.

From this section, two questions had high t-values. A t-value of 2.37 with a Prob > |T| of .02 was calculated when asked if inland terminal or subterminal elevators would use a computerized trading system. Officers and directors gave a response mean of 3.17 with a standard deviation of 1.15, while elevator managers gave a response mean of 3.73 with a standard deviation of .79. Both thought this characteristic was moderately to greater than moderately important.

When asked if export elevators would use a computerized trading system, a t-value of 2.53 was derived with a Prob > |T| of .02. Officers and directors gave a response mean of 3.43 with a standard deviation of .99, while elevator managers gave a response mean of 4.00 with a standard deviation of .58. Elevator managers showed more agreement that inland terminal or subterminal elevators and export elevators would use a computerized trading system. They foresee a computerized trading system as giving smaller local elevators increased access to more distant elevators. This increased access also increases the number of selling alternatives available to them.

Conclusions for Combining Elevator Surveys

The t-statistic was also used to estimate differences between the means of the two elevator samples. Three of the 70 characteristics on electronic marketing yielded a t-value indicating a significant difference between the two samples. These three characteristics, however, did not exhibit a large empirical difference.

The acceptance criterion for combining the elevator surveys is that 90 percent of the calculated t-values for the questions analyzed are considered nonsignificant (five percent significance level). More

than 90 percent were not statistically significant, thus the officers and directors and federally inspected warehouse surveys were combined.

CHAPTER IV

ANALYSIS AND RESULTS

This study concentrates on the perceived need and benefits from an electronic marketing system. Need for electronic marketing was evaluated using four sections of the producer and elevator surveys. These sections include: 1) pricing characteristics, 2) information services, 3) operational characteristics, and 4) transportation services. An additional section was used to analyze who might use an electronic information or trading system and how long it would take for the system to become operational.

Benefit from electronic marketing was determined through two sections of the producer and elevator surveys. The first section is used to determine who could benefit from electronic marketing. The other section covers who should have the responsibility of operating an electronic marketing system.

Familiarity with electronic marketing was not analyzed. Interpretation of familiarity varies among producers. Those who are very familiar may consider themselves less than moderately familiar. On the other hand, those who may have read one article about electronic marketing may consider themselves greater than moderately familiar.

Fifteen producers had marketed commodities by an electronic marketing method. An additional thirty-six producers were aware of others who had bought or sold commodities electronically. TELCOT, an

electronic marketing method for buying and selling cotton, was one method used by producers. Other methods included tele-auction for marketing slaughter lambs, video-auction for marketing slaughter hogs and slaughter cattle, and the use of computer terminals as information sources.

Eight elevators had marketed commodities by an electronic marketing method. An additional 13 elevators had bought or sold commodities electronically. TELCOT was one method used by elevators. Other methods included tele-auction for marketing feeder pigs and hay, video-auction for marketing feeder cattle, and computerized information systems for all commodities.

Need for Electronic Marketing

A series of questions was used to determine the need for electronic marketing. These questions also helped to determine what characteristics in an electronic marketing system would be important to producers and elevators. One particular question asked respondents to indicate the need for electronic marketing of grains. A chi-square value of 24.48 was calculated between producer and elevator responses. A tabled chi-square value of 9.49 or less is preferrable (at the five percent significance level). This indicated that a significant difference exists between producer and elevator responses.

Producers think the need for electronic marketing is moderately to greater than moderately important. The mean response for producers was 3.50 compared with a mean response from elevators of 2.72. Elevators see this need as less than moderately to moderately important.

Producers seem to favor any concept that might potentially increase their market position. Elevators, on the other hand, may prefer the current method to buy and sell grain. The element of personal contact, either through a phone conversation or on a one-on-one basis, may be a part of merchandising that these elevators are unwilling to forego.

Other questions to determine the importance of potential characteristics available through electronic marketing were included. These questions were divided into sections of similar characteristics. Characteristics available through electronic marketing included: 1) pricing characteristics, 2) information services, 3) descriptive characteristics, 4) storage and transportation services, 5) operational characteristics, and 6) a section of questions concerning use of an electronic system and the amount of time it would take for the system to become operational.

Pricing Characteristics

Potential pricing characteristics offered through electronic marketing were analyzed. Related questions from the producer and elevator survey were compared to determine whether a statistically significant difference existed between the two groups. Pricing characteristics common to producers and elevators include: 1) importance of producers offering grain at a set price and waiting until a buyer bid that amount compared with the importance of elevators bidding on grain based on the producer's asking price, 2) participation in grain auctions, and 3) the ability of producers to frequently change their reservation or floor prices compared with an elevator's ability

to frequently change bid or offer prices. Statistical results from the response to pricing characteristics are summarized is Table I.

TABLE I

POTENTIAL PRICING CHARACTERISTICS

Pricing Characteristic	Producer Mean*	Producer S.D.**	Elevator Mean*	Elevator S.D.**	Chi-Square
a. Elevator's bidding on grain at a set price offered by producers.	3.67	1.25	3.13	1.27	10.24
b. Participation in grain auctions.	3.04	1.36	2.42	1.05	15.23
c. Flexibility in changing asking or offer prices.	3.46	1.32	3.65	1.34	8.83

*Mean = Response Mean

**S.D. = Standard Deviation

Elevator's Bidding on Grain at a Set Price Offered by Producers. Importance of producers offering grain at a set price compared with importance of elevators bidding on grain based on the producer's asking price yielded a chi-square value of 10.24. This is compared with a tabled chi-square value of 9.49 or less (at the 5 percent significance level). This means that a significant difference between responses of producers and elevators existed. A mean of 3.67 and standard deviation

of 1.25 was calculated for producer responses compared with a mean of 3.13 and standard deviation of 1.27 for elevators. Both responded in the moderately to greater than moderately important range. The difference between respondents was large enough, however, to conclude that producers and elevators viewed this characteristic differently.

Producers may view electronic marketing as offering them a stronger market position. By offering wheat at a set price, producers reflect their opinion on an acceptable price for wheat. Producers may also see a potential for advertising their grain to more buyers.

Elevators on the other hand, view the ability to bid on grain based on producer's asking price as less important. They currently offer a price to producers at a set margin above what the elevator can in turn sell that grain for. Elevators may see this characteristic as unrealistic because they are basically locked into the price that is offered to producers.

Grain Auctions. Participation in grain auctions by producers and elevators yielded a chi-square value of 15.23. The null hypothesis is thus rejected and responses between these two groups are significantly different. A mean of 3.04 with a standard deviation of 1.36 was calculated for producer responses. Elevators had a response mean of 2.42 with a standard deviation of 1.05.

Through a grain auction market, grain could be offered at a set price. The buyer would have a predetermined time allotment in which to bid on that grain. After that time, if the bid is not accepted, it could be withdrawn or changed. This process would continue until the auction session closed. Grain could also be auctioned to the highest

bidder. In this case, the seller might be allowed to have the final say in acceptance or rejection of the bid.

On the average, producers thought the ability to have grain auctioned to the highest bidder was moderately important. Elevators, on the other hand, foresaw an auction market as less than moderately to moderately important. Once again producers express a desire for a more active role in the pricing process. Neither groups thought grain auctions were necessarily the solution, but they could visualize this type of system being operational.

Flexibility in Changing Asking or Offer Prices. The ability for producers to change their reservation or floor prices compared with an elevator's ability to frequently change bid or offer prices yielded a chi-square value of 8.83. The null hypotheisis is not rejected in this case and a similiarity between responses is prevalent.

Both producers and elevators thought the frequent changes of asking or offer prices was moderately to greater than moderately important. Neither wanted to get trapped in a position during sudden and/or drastic market changes. Some form of this option may be necessary before producers or elevators will participate.

Other Pricing Characteristics for Producers. Characteristics were included in the producer survey that did not apply to elevators. The ability of producers offering to forward contract grain at a set price and wait until a buyer bids that amount was one of them. Along the same line was the ability to place a reservation or floor price (unknown to buyers). A response mean of 3.63 for both of these

characteristics indicated that producers viewed them as moderately to greater than moderately important.

Another characteristic asked of producers was the importance of potentially placing futures market orders over an electronic system. A response mean of 3.34 was derived. This indicates that on the average producers would like to have the ability to place futures market orders. It could be hypothesized that producers who filled out the surveys were more progressive. These producers might presently hedge or be interested in learning how to hedge. Easy access to the commodity futures market information would then be a desirable attribute. Producers on a whole, however, have shown reluctance to hedge grain. For this reason, wide use of this option by producers may be an unrealistic concept.

Producers were also asked the importance of offering their grain to more buyers. A response mean of 4.40 indicated a greater than moderate to highly important need for an increased number of buyers for their wheat. Producers would obviously like to have more market outlets.

Other Pricing Characteristics for Elevators. Some pricing characteristics were included in the elevator survey, but not in the producer survey. Expanded information about quantities of grain offered at specified prices was one of these characteristics. The elevator's response mean was 3.04, indicating this characteristic is moderately important to them.

The opportunity for an expanded procurement area for grain was also included in the elevator survey. A mean elevator response of 3.10

was calculated. Along the same line was the opportunity for an expanded sales area. A response mean of 3.31 was derived.

Electronic marketing may have the potential of increasing sales and procurement areas for all elevators. Elevators thought these characteristics were moderately to greater than moderately important. Elevators may also recognize that this increased sales and procurement area would apply for all elevators and thus increase competition between elevators. This increased competition may or may not increase sales and procurement areas for individual elevators.

Summary of Pricing Characteristics. The average response of producers toward potential pricing characteristics of an electronic marketing system were more favorable than elevator responses. The majority of responses by both groups ranged from moderately to greater than moderately important. Producers may see electronic marketing as giving them more bargaining power or a larger market. Both elevators and producers want flexibility in an electronic marketing system to insure easy entrance and exit. A more accurate price reflecting the true value of wheat might be possible with both buyers and sellers taking a more active role in the market place.

Information Services

Electronic marketing may improve the quality and quantity of information services currently available to producers and elevators. Those information services include: 1) improved access to details of the most recent individual trades, 2) improved access to summaries of all sales and purchases, 3) improved access to forward contract offers

from producers and bids from buyers, and 4) improved access to other market information. Statistical results for these information services are summarized in Table II. Improved access to other market information is excluded from Table II for later summary.

TABLE II

INFORMATION SERVICES OFFERED THROUGH ELECTRONIC MARKETING

Information Service	Producer Mean*	Producer S.D.**	Elevator Mean*	Elevator S.D.**	Chi-Square
a. Details of recent trades.	4.04	1.07	3.44	1.15	19.04
b. Summaries of all trades.	4.09	0.97	3.38	1.00	28.78
c. Forward contract offers from producers and bids from buyers.	4.15	1.00	3.35	1.03	29.97

*Mean = Response Mean

**S.D. = Standard Deviation

Details of Recent Trades. Improved access to details of the most recent individual trades yielded a chi-square of 19.04 between producers and elevators. This indicated that responses from the two groups were independent. Producers thought this information service was greater than moderately important with a response mean of 4.04 and standard deviation of 1.07. This is compared with a response mean of

3.44 and standard deviation of 1.15 from elevator responses. The elevators interpreted this service as moderately to greater than moderately important.

Access to information on recent trades would inform market participants about prices and quantities of grain currently being traded. Most elevators presently have some type of information service updating them on prices and volume of futures market transactions. For this reason, they may not see this service as important. Elevators may also have a higher comprehension of information needed to make effective marketing decisions. Producers, on the other hand, may desire a different type of information such as sales and purchases at a local level rather than a national level.

Summaries of All Trades. Improved access to summaries of all sales and purchases yielded a chi-square of 28.78. There was a significant difference in responses. Producers stressed a greater than moderate importance. The average response was 4.09 with a standard deviation of .97. Elevators thought this characteristic was moderately to greater than moderately important. The average response was 3.38 with a standard deviation of 1.00. This may go back to elevators having constant access to futures market summaries. A desire for summaries of cash trades is an attractive feature potentially offered through this information service.

Forward Contract Offers from Producers and Bids from Buyers. Improved access to forward contract offers from producers and bids from buyers was analyzed. A chi-square value of 29.96 indicated independence between the responses of the survey groups. An average

response of 4.15 and standard deviation of 1.00 by producers indicated this characteristic was greater than moderately to highly important. Elevators see this as moderately to greater than moderately important with an average response of 3.35 with a standard deviation of 1.03.

Improved access to forward contract bids may be the result of producers wanting to increase use of these contracts, to have more variety in forward contracts offered, or to be better informed on contracts currently available. Many elevators think this is important because forward contracts could increase the amount of grain handled. It is also a possible way of increasing market share.

Other Market Information. Improved access to other market information is summarized in Table III. Of these services, producers and elevators agree that improved access to local, futures, and forecast prices, along with transportation rates and USDA reports were moderately to greater than moderately important. An insignificant chi-square value for those particular services indicated no response difference between producers and elevators.

There was a statistically significant difference between producers and elevators concerning the importance of other information services. These included general and commodity news, and national and world prices. These services yielded a chi-square above 9.49 (tabled value at the 5 percent significance level).

Producers viewed having access to general news as being moderately important to greater than moderately important. Elevators thought this service was less than moderately important. Producers viewed having access to commodity news as greater than moderately important, while elevators thought this service was moderately to greater than

moderately important. News information is presently available in many forms (i.e. television, radio, newspaper, etc.). Having constantly updated information when desired is a favorable characteristic of electronic marketing.

TABLE III

IMPROVED ACCESS TO OTHER MARKET INFORMATION

Information Service	Producer		Elevator		
	Mean*	S.D.**	Mean*	S.D.**	Chi-Square
a. News: General	3.49	1.19	2.91	0.97	16.68
Commodity	4.08	0.94	3.54	1.09	13.91
b. Prices: Local	4.11	1.04	3.75	1.05	7.89
National	4.06	1.02	3.38	1.05	20.76
World	3.94	0.98	3.20	1.06	23.43
Futures	3.95	1.04	3.90	1.06	0.63
Forecast	3.74	1.17	3.68	1.02	3.36
c. Transportation Rates	3.80	1.11	3.60	1.18	2.86
d. USDA Reports	3.46	1.26	3.44	1.25	6.55

*Mean = Response Mean

**S.D. = Standard Deviation

Producers considered local and national prices as the most important pricing services. Elevators thought local and futures prices were most important. Since most producers lack expertise needed to hedge their wheat and have not developed confidence in futures trading, they are less likely to see importance in futures prices. It is also possible that producers are unaware of the role that futures prices play in helping to establish the cash price of wheat.

Elevator responses toward improved access to market information was typically lower than producer responses. One possible reason is that elevators probably have better and more timely information than producers.

Other Information Services Available to Producers. Improved access to cash price bids from buyers was a potential service offered to producers. Producers perceived this service as greater than moderately important to highly important. The response mean was 4.40. Producers would like to be constantly updated on cash price offers. This would help keep them updated with short-term price changes. They could have these prices readily available to them without having to contact several different elevators.

Three classes of weather information was also included in the producer surveys. The classes were local, national, and world. Response means of 3.65, 3.67, and 3.45, were calculated respectfully. The mailed producer survey asked the importance of access to information on weather with no geographic divisions. The response mean for this was 3.57.

Other Information Services Available to Elevators. Expanded information about available storage facilities was a potential information service extended to elevators. A response mean of 2.87 indicated that elevators saw this potential service as less than moderately important to moderately important. Insufficient storage facilities have rarely been a major concern to elevators. Most elevators currently have sufficient storage capacities. If not, they have other outlets readily available for storing grain.

Other information services of concern to elevators, but not covered in the producer survey, include having access to currency exchange rates, trade leads, and local, national, and world weather. Elevators gave an average response of 2.32 for having access to currency exchange rates and an average response of 3.17 for having access to trade leads. Response means of 3.20, 3.24, and 2.97 were calculated for having access to local, national, and world weather respectfully.

Since none of the elevators surveyed were export facilities, the importance of currency exchange rates was not prevalent. The other information services were moderately to greater than moderately important.

Summary of Information Services. Most potential information services offered through electronic marketing were perceived as moderately to greater than moderately important. Producers on a whole, foresaw a greater need for these services. Since rural newpapers are sometimes delivered a day late and television does not provide adequate information or accomodate farmer's time schedules, a need for constantly updated information is prevalent. Elevators, on the other

hand, have access to several different information services. Thus, a need for improved information may not be a high priority. Both survey groups, however, see a need for improvement in quantity, quality, timing, and accuracy of information currently offered.

Descriptive Characteristics

Producers and elevators were surveyed on the importance of buying and selling grain based on descriptive characteristics. Commodities marketed on descriptions that are clear and meaningful to all market participants is a necessary condition for electronic markets to be successful. There was no statistically significant difference in responses between elevators and producers on the following characteristics: location (FOB a specific point), delivery conditions, quantity, moisture, broken kernels, defects, and DHV. Summaries of the response means for producers and elevators and the chi-square value between the two groups for the above mentioned characteristics are given in Table IV.

Descriptive characteristics listed in Table IV were considered moderately to greater than moderately important by producers and elevators. Wheat has to meet certain specifications. If these specifications are not met, discounts are applied. Location, delivery conditions, quantity, moisture, broken kernels, defects, and DHV are all common characteristics used to describe wheat. These characteristics are important to all market participants.

A significant chi-square value indicated lack of agreement on the importance of other characteristics between elevators and producers. These characteristics are summarized in Table V and include: U.S.

grade, protein, heat damage, total damage, test weight, and foreign material. Response means for producers were in the greater than moderately important range. Response means for elevators were less than those of producers.

TABLE IV

DESCRIPTIVE CHARACTERISTICS WITH LOW CHI-SQUARE VALUES BETWEEN PRODUCERS AND ELEVATORS

Information Service	Response Mean		Chi-Square
	Producer	Elevator	
a. Location (FOB a Specific Point)	4.00	3.85	5.49
b. Delivery Conditions	4.04	3.89	4.76
c. Quantity	3.97	3.96	5.85
d. Moisture	3.99	3.66	5.87
e. Broken Kernels	3.44	3.38	4.38
f. Defects	3.65	3.43	4.45
g. DHV	3.45	3.19	3.76

Producers appear to rank all characteristics the same (range of .20), while elevators were more selective (range of .48). Elevators ranked U.S. grade well above the other characteristics. This could be

because U.S. grade includes all characteristics except protein. Furthermore, grading characteristics are used more between elevators than between elevators and producers. Thus the lower response from elevators could be due to familiarity with the descriptions rather than preference.

TABLE V

DESCRIPTIVE CHARACTERISTICS WITH SIGNIFICANT CHI-SQUARE VALUES BETWEEN PRODUCERS AND ELEVATORS

Descriptive Characteristic	Response Mean		Chi-Square
	Producer	Elevator	
a. U.S. Grade	4.02	3.75	10.00
b. Protein	4.02	3.44	27.64
c. Heat Damage	3.82	3.27	14.39
d. Total Damage	3.95	3.39	15.15
e. Test Weight	3.98	3.54	13.48
f. Foreign Material	3.90	3.43	9.83

Summary of Descriptive Characteristics. Average producer responses ranged from 3.82 to 4.04 for all of the descriptive characteristics except broken kernels, defects, and DHV. These three characteristics were given lower average responses.

Elevators face strict grade requirements when selling wheat. Thus, they may be more selective with their response toward descriptive characteristics. Since most wheat is currently sold based on description, converting to an electronic marketing system should not be a major problem when describing grain.

Storage and Transportation Services

The need for storage and transportation services is different for producers than for elevators. Storage and transportation services available to producers through electronic marketing might include the ability to: 1) locate available storage for grain, 2) offer grain to elevators for a set storage fee, 3) locate transportation for moving grain, and 4) negotiate freight rates. Transportation services available to elevators through electronic marketing might include the ability to: 1) locate truck transportation, 2) locate rail transportation, 3) locate barge transportation, and 4) negotiate freight rates.

Storage and Transportation Services for Producers. Storage and transportation services offered to producers are summarized in Table VI. Producers viewed these services as moderately to greater than moderately important. The ability to locate transportation and storage services electronically and to have this information readily available is attractive to producers. This would reduce time spent searching for needed information. The ability to offer grain at a set storage fee and negotiate freight rates for grain shipping were also important. These services might once again allow producers an opportunity to increase their role in the marketing process.

TABLE VI

STORAGE AND TRANSPORTATION
SERVICES FOR PRODUCERS

Storage and Transportation Services	Response Mean	Standard Deviation
a. Locate Available Storage for Grain	3.46	1.25
b. Offer Grain to Elevators for a Set Storage Fee	3.54	1.19
c. Locate Transportation for Moving Your Grain	3.59	1.23
d. Negotiate Freight Rates for Grain Shipping	3.82	1.25

Transportation Services for Elevators. Transportation services offered to elevators are summarized in Table VII. The ability to negotiate freight rates was hypothesized as the most important transportation services available to elevators. Freight rates for elevators are usually set by the shipping company or are negotiated between shipping company and elevator. In either case, rates are negotiated privately and a rule of secrecy is understood by all participants. Electronic marketing poses the potential for changing the current policies of secrecy when establishing freight rates. These rates could still be established electronically and secretly. The fear of others accessing that information either legally or illegally, however, detours many from being totally supportive of this service.

TABLE VII

TRANSPORTATION SERVICES
AVAILABLE TO ELEVATORS

Transportation Services	Response Mean	Standard Deviation
a. Locate Truck Transportation	2.93	1.40
b. Locate Rail Transportation	2.82	1.44
c. Locate Barge Transportation	1.80	1.15
d. Negotiate Freight Rates	3.17	1.51

Ability to locate truck and rail transportation was foreseen by elevators as less than moderately important. Response means of 2.93 and 2.82 were calculated for the ability to locate truck and rail transportation, respectfully. These two modes of transportation are most common to elevators handling wheat.

As elevators develop good working relationships with transportation companies, the need for locating rail and truck transportation decreases. This need for locating transportation services may become important during harvest or other occasions when transportation companies are exceptionally busy. Seasonality of need for locating rail and truck transportation, and established relationships between elevators and transportation companies have a tendency to lessen the importance of this service.

The ability to locate barge transportation was hypothesized as the least important transportation service available to elevators. The

majority of wheat produced in Oklahoma and Kansas is not readily accessible to a waterway for barge transportation. The Arkansas River navigation system, which ends at the Port of Catoosa in northeastern Oklahoma, and the Missouri River in eastern Kansas are the only barge systems accessible to wheat handlers in Kansas and Oklahoma. Only a small portion of the grain is shipped by barge.

Summary of Storage and Transportation Services. Elevators and producers would like to have more information about freight rates. Both groups see this service as being moderately to greater than moderately important. Producers may see more potential for negotiation of freight rates. Elevators with substantial grain business have a higher degree of bargaining power than producers. Nonetheless, elevators, because of economic and geographic reasons, are sometimes trapped by a dependency on particular modes of transportation.

Elevators showed a lack of interest in locating truck, rail, or barge transportation. Producers would like to have information about available transportation and storage readily accessible through means of an electronic system. Ability to offer grain at a set storage fee is also a potential service attractive to producers.

Operational Characteristics

Operational characteristics common to producer and elevator surveys include the ability to: 1) market grain knowing that buyer and seller performance is guaranteed, 2) send and receive electronic mail, and 3) use the computers for other consumer services (airline reservations, catalog shipping, etc.). Statistical results are summarized in Table VIII.

TABLE VIII

POTENTIAL OPERATIONAL CHARACTERISTICS

Operational Characteristic	Producer Mean*	Producer S.D.**	Elevator Mean*	Elevator S.D.**	Chi-Square
a. Market grain knowing that buyer and seller performance is guaranteed	4.50	0.75	3.69	1.21	32.65
b. Send and receive electronic mail	3.29	1.28	2.63	1.15	15.72
c. Use the computers for other consumer services	2.77	1.40	2.07	1.00	16.77

*Mean = Response Mean

**S.D. = Standard Deviation

Performance Guarantees. A chi-square value of 32.65 was derived from the potential ability to market grain knowing that buyer and seller performance is guaranteed. This indicated a statistically significant difference between responses of producers and elevators. Producers had a response mean of 4.50 and standard deviation of .75 compared with a response mean of 3.69 and standard deviation of 1.21 for elevators. On the average, producers saw this characteristic as greater than moderately to highly important. Elevators saw this as being moderately to greater than moderately important.

Performance guarantees are a way of minimizing risk. Most elevators have a tendency to be more knowledgeable about grain marketing. They may have given a lower response mean because they are

very particular about who they do business with. Lack of participation, however, might occur if such guarantees are not included in an electronic method of marketing.

Electronic Mail. Ability to send and receive electronic mail yielded a chi-square value of 15.72 This indicated a significant difference between producer and elevator responses. Producers thought the ability to send and receive electronic mail was moderately to greater than moderately important. The average response was 3.29 with a standard deviation of 1.28. Elevators thought this characteristic was less than moderately to moderately important. The average response was 2.63 with a standard deviation of 1.15.

The responses to sending and receiving mail through an electronic system were unexpected. Elevators were expected to be more favorable toward this service than producers. Elevators may fear the possibility of important documents being illegally tampered with. They might have a higher trust in other mediums of sending or receiving mail.

Consumer Services. Ability to use computers for other consumer services was also analyzed. A chi-square value of 16.77 was calculated indicating responses from producer and elevator surveys were independent. Producers had a response mean of 2.77 and standard deviation of 1.40, compared with a response mean of 2.07 and standard deviation of 1.00 by elevators. Both groups saw this as less than moderately to moderately important.

Producers, as well as elevators, are not willing to pay for a service not frequently used. Some participants may think that such extras could add to the cost and complexity of the system. If this

service was offered at no extra cost, they might be more favorable toward it. Results suggest that the fewer extras the better, at least in the initial stages of development or until participants familiarize themselves with it.

Other Operational Characteristics for Producers. Two operational characteristics were included in the producer survey that did not apply to elevators. Importance of accessing a trading system from your home (with a telephone and computer terminal or microcomputer) yielded an average response of 3.99. Ability to access the trading system from a local agribusiness yielded an average response of 3.90. These characteristics were seen as greater than moderately important. Producers seem to be indifferent about where the system is accessed.

Progressive producers realize that in order to keep up with technology and remain competitive, they are going to have to make efficient marketing decisions. Computers are one possible tool enabling them to stay on top of market conditions. If cost of purchasing a computer can be justified through an electronic trading or information system, more producers may be tempted to invest in computerized systems. Whether accessing a computer at home or at a local agribusiness, knowledge of available computer packages and how to use them may be a valuable asset to producers.

Summary of Operational Characteristics. A statistical difference existed between producer and elevator responses on the perceived importance of operational characteristics offered through an electronic marketing system. Producers were relatively more favorable toward marketing grain knowing that buyer and seller performance is

guaranteed, sending and receiving electronic mail, and using the computers for other consumer services. Both groups emphasized the importance of integrity. Furthermore, they showed a lack of interest in additional services that could possibly reduce simplicity and add to costs.

Use of an Electronic Marketing System

Use of electronic marketing and the perceived time period before a system might become operational was determined with a series of six questions. These questions asked producers and elevators to rank their agreement with the following statements: 1) grain will be bought and sold through a computerized trading system within five years, 2) transportation services will be bought and sold through a computerized trading system within five years, 3) local elevators will use a computerized trading system, 4) I will use a computerized trading system, 5) local elevators will use a computerized information system, and 6) I will use a computerized information system. Statistical results are summarized in Table IX.

Grain Bought and Sold Through a Computerized Trading System Within Five Years. A chi-square value of 39.82 indicated a statistically significant difference between producer and elevator agreement that grain will be bought and sold over a computerized system within five years. Producers had a response mean of 3.67 with a standard deviation of 1.06 indicating the average producer was uncertain or agreed with this. On the average, elevators disagreed or were uncertain with a response mean of 2.75 and standard deviation of 0.90.

TABLE IX

USE OF ELECTRONIC MARKETING AND THE PERCEIVED TIME PERIOD BEFORE A SYSTEM MIGHT BECOME OPERATIONAL

Pricing Characteristic	Producer		Elevator		
	Mean*	S.D.**	Mean*	S.D.**	Chi-Square
a. Grain will be bought and sold through a computerized trading system within five years.	3.67	1.06	2.75	0.90	39.82
b. Transportation services will be bought and sold through a computerized trading system within five years.	3.41	1.12	2.70	0.90	21.87
c. Local elevators will use a computerized trading system.	3.94	0.98	2.83	1.06	49.58
d. I will use a computerized trading system.	3.02	1.23	2.86	1.03	7.57
e. Local elevators will use a computerized information system.	4.18	0.82	3.57	0.92	23.49
f. I will use a computerized information system.	3.40	1.18	3.56	0.92	16.57

*Mean = Response Mean

**S.D. = Standard Deviation

Producers are aware of computerization taking place in most businesses and agriculture is no exception. These producers may see

five years as a short adaption period, however. Results may indicate that producers perceive a change to computers within the near future.

Both groups see total participation from buyers and sellers as unrealistic. Elevators showed less agreement in computerized trading within five years. These elevators may hypothesize current marketing methods as efficient. They may also think five years is a short period of time for the system to gain integrity and become operational.

Transportation Services Bought and Sold Through a Computerized Trading System Within Five Years. Agreement between producers and elevators toward transportation services being bought and sold electronically within five years yielded a chi-square value of 21.87. Responses between the two groups were significantly different. A response mean of 3.41 and standard deviation of 1.12 was calculated from producers. This is compared with a response mean of 2.70 and standard deviation of 0.90 from elevators.

Responses to transportation services traded over a computerized system within five years were similar to responses from grain being traded over a computerized system. Producers were more favorable toward these services than elevators. If a system is developed for trading grain, adapting that system to include trading of transportation services should be fairly simple. Time saved from locating transportation services when needed could be beneficial to producers.

Use of a Trading System by Local Elevators. There was a statistical difference between producers and elevators response to the use of a trading system by local elevators. A chi-square value of

49.58 was calculated. Producers think elevators will use a grain electronic market. The response mean was 3.94 with a standard deviation of 0.98. Elevators, on the other hand, were uncertain or had no opinion with a response mean of 2.83 and standard deviation of 1.06.

Producers realize that most elevators currently have access to some form of a computerized information service. Converting this information system to a system for trading grains may be visualized as a fairly simple process. Producers evidently view their local elevator as progressive and willing to make changes in merchandising methods for grain.

Elevators were uncertain about using a computerized trading system. Elevators may think the current system is efficient and there is no need for change. Lack of familiarity may also cause them to have difficulty conceptualizing operation of a computerized trading system. Familiarity with unsuccessful electronic systems, conversely, may cause elevators to be leary of an electronic market for grains.

Personal Use of a Computerized Trading System. Agreement was reached between producers and elevators when asked whether they would personally use a computerized trading system. A chi-square value of 7.57 indicated no significant difference between responses of the two groups.

A response mean of 3.02 and standard deviation of 1.23 was calculated from producer responses. A response mean of 2.86 and standard deviation of 1.03 was calculated from elevator responses. Both groups were uncertain or had no opinion. Producers and elevators might be willing to participate in a program where benefits exceed costs. A computerized trading system has never been attempted for

grains. For this reason, most buyers and sellers will have to be guaranteed benefits before they will participate. Early innovators will need to exist to provide integrity in the system.

Use of a Computerized Information System by Local Elevators. Producers and elevators were asked the extent of agreement to which local elevators would use a computerized information system. A chi-square value of 23.49 indicated a significant difference between responses. Producers had a response mean of 4.18 and standard deviation of 0.82, compared with a response mean of 3.57 and standard deviation of 0.92 from elevators.

Producers do not have a problem visualizing this concept. They are aware of computerized information systems currently in operation at most elevators. Some producers, however, may sell grain to elevators without this service, or may not understand the current information systems that are available.

Elevators are also aware of computerized information systems currently available to them. For them to be convinced of changing to a different system, that system would have to supply information above and beyond what they currently have access to. An information and trading system available in one package may be attractive. Elevators could then acquire needed information through one complete system.

Personal Use of a Computerized Information System. Extent of agreement toward personal use of a computerized information system was analyzed between producers and elevators. Responses between the two groups were similar. The null hypothesis that the probability of

producers and elevators answering in the same manner was rejected, however, when a chi-square of 16.57 was calculated.

Producers and elevators tended to agree they would use a computerized information system. The average response from producers was 3.40 with a standard deviation of 1.18. The average response from elevators was 3.56 with a standard deviation of 0.92.

The majority of elevators use a computerized information system. Increased and improved information provides a decisionmaker with the background needed to make effective decisions. Elevators are aware of the importance of grain marketing and seem to be willing to make changes needed to improve their merchandising skills.

Other Responses from Elevators. Questions on use of an electronic marketing system were included in the elevator survey, but not in the producer survey. Elevators were asked the degree to which they agreed or disagree that: 1) inland terminal or subterminal elevators would use a computerized trading system (response mean of 3.55), 2) inland terminal or subterminal elevators would use a computerized information system (response mean of 3.82), 3) export elevators would use a computerized trading system (response mean of 3.85), and 4) export elevators would use a computerized information system (response mean of 3.97).

Elevators responded similarly to all of these questions. Most had a tendency to agree that terminal, subterminal, and export elevators might adapt to a computerized trading or information system more readily. They may see more room for electronic marketing at an international versus domestic level. On the other hand, they may also see larger elevators providing the electronic facility. This might

allow local elevators to have direct access to terminal or export elevators.

Summary on Use of an Electronic Marketing System. Producers were more agreeable toward use of an electronic trading or information system. They seem to favor any potential improvement that might increase profit or their position in the grain marketing process.

Producers and elevators were both fairly skeptical about personal use of a computerized trading system. Since an electronic system for grains has never been attempted, they may find it difficult to conceptualize how the system might operate. They were more favorable toward personal use of a computerized information system.

Integrity of the system and observable benefits would have to be validated before the system would be widely accepted. Both survey groups indicated that it might take more than five years for the system to become operational.

Benefit from Electronic Marketing

Benefit from electronic marketing was analyzed through two sections in the producer and elevator surveys. The objective of the first section was to determine who would benefit and the degree of benefit derived. The second section included responsibilities involved in electronic marketing and groups which might be held accountable.

Market Participation

There are several potential grain buyers and sellers along with other firms who might be involved in an electronic market for grains. Producers and elevators were surveyed to determine perceived benefit

derived from each participant. The survey section on benefit was excluded from the producer mail survey. Results for producers will include only results from the producer interview survey.

A t-test was conducted between the two elevator survey groups to determine whether a difference existed between responses. Low t-values indicated no statistical difference between the two elevator samples. Results from the two surveys were then combined to form one elevator sample.

Benefit to Sellers. Benefit to market participants was examined using a chi-square test between producer and elevator responses. Participant benefit is analyzed from a seller perspective and a buyer perspective. Sellers include grain producers, elevators, and brokers. Statistical results from the perceived benefit to grain sellers are summarized in Table X.

Benefit to grain producers yielded a chi-square value of 44.28. This indicated a significant difference between responses of producers and elevators. Producers had a response mean of 4.17 and standard deviation of 1.22. Producers perceived themselves as receiving greater than moderate benefit from electronic marketing. Elevators, on the other hand, foresaw moderate benefit for producers through a response mean of 3.00 and standard deviation of 1.17.

Perceived benefit from electronic marketing for elevators yielded a chi-square value of 22.48. This indicated a significant difference between producer and elevator responses. Both survey groups, however, agreed that elevators would receive more benefit than producers. Producers showed this through a response mean of 4.28 and standard deviation of 1.06. Elevators increased their average response to 3.58

with a standard deviation of 1.18. They both thought elevators would receive greater than moderate to great benefit from electronic marketing.

TABLE X

BENEFIT TO GRAIN SELLERS

Seller	Producer		Elevator		Chi-Square
	Mean*	S.D.**	Mean*	S.D.**	
a. Producers	4.17	1.22	3.00	1.17	44.28
b. Elevators	4.28	1.06	3.58	1.18	22.48
c. Brokers	3.96	1.32	3.96	1.04	6.05

*Mean = Response Mean

**S.D. = Standard Deviation

Brokers were the last seller analyzed. Producers and elevators agreed on the benefit received by brokers. A chi-square value of 6.05 indicated no statistical difference between the two groups. A mean value of 3.96 was approximated from both producer and elevator responses.

Producers and elevators thought brokers would derive greater than moderate benefit from electronic marketing. They may perceive the broker as an intermediary. Even though producers saw a large benefit

accruing to brokers, they saw themselves and elevators as deriving more benefit than brokers. Producers might benefit from increased communication with their local elevator. They might also benefit from an increase in local price and cost information.

Elevators thought brokers would benefit more than themselves. Producers would benefit less than any other seller group, according to elevator responses. Benefit to elevators as sellers of grain would be from an increase in pricing efficiency. Price discovery would be upgraded because most recent trades would be included in calculating current values of grain. Elevators may also benefit from having updated information about prices at different locations. Elevator profit may be increased due to the potential for selling at higher prices in more distant locations.

Benefit to Buyers. A chi-square between producers and elevators was also used to analyze similarities and differences between expected benefit to buyers of grain. Buyers include livestock feeders or other farmers, local elevators, grain millers and processors, and feed mills. Statistical results from the perceived benefit to grain buyers are summarized in Table XI.

Benefit to livestock feeders or other farmers from electronic marketing was analyzed. A chi-square value of 31.40 indicated a significant difference between the responses of producers and elevators. Producers gave an average response of 4.17 with a standard deviation of 1.03. This is compared with an average response of 3.21 and standard deviation of 1.13 given by elevators.

TABLE XI

BENEFIT TO GRAIN BUYERS

Buyer	Producer Mean*	Producer S.D.**	Elevator Mean*	Elevator S.D.**	Chi-Square
a. Livestock feeders or other farmers	4.17	1.03	3.21	1.13	31.40
b. Local elevators	3.96	1.24	3.39	1.26	11.92
c. Grain millers and processors	4.00	1.09	4.00	1.21	2.53
d. Feed mills	3.96	1.07	3.71	1.18	1.90

*Mean = Response Mean

**S.D. = Standard Deviation

Benefit to local elevators, as a buyer of grain, yielded a chi-square value of 11.92. A statistical difference existed between producer and elevator responses. Producers had a response mean of 3.96 with a standard deviation of 1.24. A response mean of 3.39 and standard deviation of 1.26 was derived from elevators.

Producers and elevators agreed on the extent to which grain millers and processors would benefit with a chi-square value of 2.53. Both groups had average responses of 4.00.

Feed mills were the last buyer researched. A chi-square value of 1.90 indicated no statistical difference existed between producers and elevators. Producers had a response mean of 3.96 and standard

deviation of 1.07. This is compared with a response mean of 3.71 and standard deviation of 1.18 given by elevators.

Producers thought all four of the different buyers would gain greater than moderate benefit from an electronic marketing system. An electronic system would help buyers to locate available grain when it is needed. They would have immediate access to available grain and details concerning location, grade, price, etc. of that grain. Potential for increased negotiation between buyers and sellers might also exist.

Elevators answered that grain millers and processors would gain greater than moderate benefit from electronic marketing. Grain millers and processors might have a greater need because they transport grain in from more distant locations. An electronic system would allow them, within a short period of time, to locate grain.

Elevators foresaw a moderate benefit to greater than moderate benefit for livestock feeders or other farmers, local elevators, and feed mills. These buyers are usually interested in buying grain at a local or regional level. An electronic marketing system would increase livestock feeders or feed mills access to individual producers or local elevators. This increased access may increase the bargaining process between grain buyers and sellers. The bargaining process might be allowed to continue until a price that satisfies both parties is decided on.

Other Participants. Other participants were included in the elevator surveys, but not in the producer survey. These participants were subterminal elevators, inland terminals, grain exporters, port elevators, commodity brokers, transportation firms, and private market

information suppliers. Mean responses and standard deviations are reported in Table XII.

TABLE XII

ELEVATOR'S PERCEIVED BENEFIT TO OTHER PARTICIPANTS FROM AN ELECTRONIC MARKETING SYSTEM

Participant	Mean Response	Standard Deviation
a. Subterminal Elevators	3.70	1.21
b. Inland Terminals	3.82	1.22
c. Grain Exporters	4.04	1.21
d. Port Elevators	3.88	1.19
e. Commodity Brokers	3.90	1.23
f. Transportation Firms	3.27	1.26
g. Private Market Information Suppliers	3.65	1.26

Responsibilities

Several groups might be involved in an electronic market. Participation and control of an electronic system were analyzed. These functions and response frequencies for producers are summarized in Table XIII. A summary of elevator responses is given in Table XIV. Some respondents indicated a desire for more than one group to share

responsibilities. This will cause total frequency to exceed the total number of respondents.

TABLE XIII

PRODUCER'S PERCEIVED ORGANIZATION OF AN ELECTRONIC MARKETING SYSTEM FOR GRAIN

Responsibility	Producers or Producer Trade Assns*	Buyers or Buyer Trade Assns*	**Private Third Party Firms	Govern-ment	Other	Total
			Frequency (row percent)			
a. Own and Control the System	77 (53.8)	21 (14.7)	38 (26.6)	4 (2.8)	3 (2.1)	143 (100.0)
b. Guarantee Delivery of Grain	90 (65.7)	22 (16.1)	18 (13.1)	5 (3.6)	2 (1.5)	137 (100.0)
c. Guarantee Payment	20 (14.7)	87 (64.0)	18 (13.2)	10 (7.4)	1 (0.7)	136 (100.0)
d. Describe and Grade Grain	35 (26.7)	26 (19.8)	47 (35.9)	22 (16.8)	1 (0.8)	131 (100.0)
e. Guarantee Quality	88 (66.7)	13 (9.9)	23 (17.4)	6 (4.5)	2 (1.5)	132 (100.0)
f. Resolve Disputes	24 (17.9)	17 (12.7)	75 (56.0)	12 (8.9)	6 (4.5)	134 (100.0)

*Assns. = Associations

**The private third party firms would be independent firms set up specifically to organize and control these functions.

TABLE XIV

ELEVATOR'S PERCEIVED ORGANIZATION OF AN ELECTRONIC MARKETING SYSTEM FOR GRAIN

Responsibility	Producers or Producer Trade Assns*	Buyers or Buyer Trade Assns*	**Private Third Party Firms	Govern-ment	Other	Total
			Frequency (row percent)			
a. Own and Control the System	17 (23.3)	23 (31.5)	31 (42.4)	1 (1.4)	1 (1.4)	73 (100.0)
b. Guarantee Delivery of Grain	33 (47.2)	21 (30.0)	11 (15.7)	1 (1.4)	4 (5.7)	70 (100.0)
c. Guarantee Payment	7 (10.0)	48 (68.6)	13 (18.6)	1 (1.4)	1 (1.4)	70 (100.0)
d. Describe and Grade Grain	13 (18.3)	16 (22.6)	26 (36.6)	15 (21.1)	1 (1.4)	71 (100.0)
e. Guarantee Quality	37 (53.6)	16 (23.2)	11 (15.9)	1 (1.5)	4 (5.8)	69 (100.0)
f. Resolve Disputes	6 (8.7)	20 (29.0)	36 (52.2)	5 (7.2)	2 (2.9)	69 (100.0)

*Assns = Associations

**The private third party firms would be independent firms set up specifically to organize and control these functions.

Ownership and Control. Producers and elevators were asked who should own and control the electronic system. Of producers surveyed, 53.8 percent preferred themselves or producer trade associations owning

and controlling an electronic marketing system. They favored a private third party firm secondly with agreement by 26.6 percent of the respondents. Fifteen percent of these producers thought this responsibility could best be handled by buyers or buyer trade associations. An additional 2.8 and 2.1 percent considered this a responsibility of the government or others respectfully.

Elevators disagreed with producers when 42.4 percent answered that private third party firms should own and control the system. Thirty-one percent responded buyers or buyer trade associations should take on this responsibility. An additional 23.3 percent thought ownership and control could best be handled by producers or producer trade associations. Two elevators thought this responsibility should go to government or others.

Producers would like to own and control the electronic market. Elevators take a different position by preferring ownership and control with either a private third party firm, or buyers or buyer trade associations. Elevators are hesitant about ownership and control by producers. Past records of failure by producers to establish an organization consistent with all producer needs and desires may be the cause for this reluctance. Elevators may also see private firms or buyers associations as more capable of establishing an electronic market. Most of these third party firms and buyers associations presently have equipment and capital necessary to organize and operate an electronic market.

Guarantee Delivery. Survey respondents were asked who should be responsible for guaranteeing delivery of grain. Both producers and elevators agreed that delivery of grain should be guaranteed by

producers. This was indicated by 65.7 percent of producer responses and 47.2 percent of elevator responses. This guarantee would more than likely be in the form of a contractual arrangement. A contractual arrangement would specify all of the terms of the trade and penalties for noncompliance.

Sixteen percent of producer and 30 percent of elevator responses indicated buyers or buyer associations should guarantee delivery. Thirteen percent of the producers and 15.7 percent of the elevators thought this responsibility should be given to private third party firms. The remaining producers thought delivery should be guaranteed by government (3.6 percent of responses) or others (1.5 percent of responses). The remaining elevators thought this guarantee could be best handled by government (1.4 percent or responses) or others (5.7 percent of responses).

Most respondents agreed the party selling grain should accept responsibility for delivery of that grain. Some questioned how producers would guarantee delivery if such arrangements were broken. These respondents were in favor of someone other than the producer guaranteeing delivery.

Guarantee Payment. The responsibility of guaranteeing payment was analyzed in the surveys. Producers and elevators agreed that buyer or buyer trade associations should guarantee payment. Sixty-four percent of producers and 68.8 percent of elevators responded in this manner. Guarantee of payment should rest in the hands of the person making payment. If the buyer is unable to pay his debts, his time as a grain buyer is limited. Legal consequences and disassociation from an

electronic marketing system might exist for those failing to make payment.

Most of the remaining producers and elevators responded producers or producer trade associations (14.7 percent of producers and 10.0 percent of elevators), or a private third party firm (13.2 percent of producers and 18.6 percent of elevators) should be in charge of guaranteeing payment. These respondents may perceive this responsibility as belonging to someone other than the buyer. Payment would involve two parties. If the buyer failed to make payment, that payment would be guaranteed by someone else.

Remaining producers thought payment guarantee would be best handled by government (10 producers) or others (1 producer). Two elevators thought payment should be guaranteed by government or others.

Describe and Grade Grain. Producers and elevators were asked their preference on who should describe and grade grain. A third party firm describing and grading grain was the choice of 35.9 percent of producers and 36.6 percent of elevators. Avoiding biasness or partiality may be the primary reason for having wheat graded by a private third party firm. A private firm specializing in grading grain would be widely recognized and generally accepted by all participants in the grain industry. The possibility may exist to increase consistency in grain description and grading.

Producer or producer associations received 26.7 percent of producer responses and 18.3 percent of elevator responses. Buyer or buyer associations received 19.8 percent of producer responses and 22.6 percent of elevator responses. Another 16.8 percent of the producers

and 21.1 percent of the elevators were in favor of government describing and grading grain. One producer and one elevator showed preference to some other individual/firm/organization taking responsibility for this function.

Producers showed preference toward producers or their trade associations, rather that elevators, grading and describing grain. They may disagree with present grading procedures. Producers who have been dissatisfied with past grading procedures may prefer to personally describe and grade wheat.

Elevators showed preference to buyers or the government grading and describing grain, instead of producers. Elevators may perceive a more uniform grading standard implemented by buyers or the government. Elevators, as buyers of grain usually sell to larger buyers. Most of these sales take place by description over the telephone. Consistent descriptive terms are important to elevators and will continue to be so unless a change in the method of merchandising grain occurs.

Guarantee Quality. When grain is sold electronically, buyers of that grain depend solely on the description given to them by the seller. A guarantee of quality would have to exist. Producers and elevators were asked to specify who they would prefer to guarantee quality.

Producers replied with 66.7 percent of total responses going to producers or their trade associations. Private third party firms received 17.4 percent of the responses and buyers or buyer trade associations received 9.9 percent of the responses. The remaining 4.5 and 1.5 percent went with the government or others respectively.

Producers or producer trade associations received 53.6 percent of the elevators responses. Twenty-three percent of the elevators thought buyers or buyer trade association should guarantee quality. An additional 15.9 percent thought this responsibility should be handled by a private third party firm. The remaining 1.5 and 5.8 percent of the elevators answered goverment or others respectively.

Most producers and elevators agree that a guarantee of quality should belong to producers or their trade associations. This guarantee would be initiated at the farm level which is the base of the marketing channel. Producers would be held responsible for any grain not meeting specifications. A set of discounts and premiums would more than likely be used.

Resolve Disputes. A method of handling disputes would have to be developed so that all trades are consummated. Lack of confidence in an electronic system might lead to insufficient participation. Insufficient participation would in turn cause a low volume of trades possibly leading to failure of the system.

Fifty-six percent of producers thought a private third party firm should be in charge of resolving disputes. Agreeing with them was 52.2 percent of elevators. These producers and elevators believe a third party firm would be more likely to give an unbiased decision. By not being affiliated with either buyer or seller, a third party firm would be less likely to allow favoritism to enter into a decision.

The second highest producer responses went to producers or their trade associations (17.9 percent of respondents). This is compared with 29.0 percent of elevators which gave buyers or their trade

associations the second highest number of responses. Producers and elevators each think they are better capable of reconciling disputes. They may think disputes can be adequately resolved by the parties involved. Bringing in a third party would include someone not directly involved in the dispute.

Other responding producers included 12.7 percent who thought buyers and their trade associations should resolve disputes. An additional 8.9 and 4.5 percent thought disputes would best be handled by government or others respectively.

Other responding elevators included 8.7 percent who thought producers or their trade associations should resolve disputes. An additional 7.2 and 2.9 percent thought disputes should be handled by government and others respectfully.

CHAPTER V

SUMMARY AND CONCLUSIONS

Electronic marketing could improve market efficiency through improved buyer and seller communications, improvement in the quality and quantity of market information, reduced costs, and increased competition. It involves the use of telecommunications and data processing to centralize trading. Thus, facilitating large numbers of buyers and sellers in the trading process. Electronic marketing can be conducted with the aid of conference telephones, video tape equipment, microcomputers, or computer terminals connected to large (main frame) computers.

For electronic markets to be successful, five characteristics must exist. These characteristics include: 1) organized trading, 2) centralization of sales by a single entity, 3) remote market access, 4) a descriptive and widely accepted grading system, and 5) post-sale shipment. Past experience has also indicated sufficient volume traded is a major determinate for a cost efficient and successful system.

Hard red winter wheat is presently traded based on a descriptive and widely accepted grading system. Wheat sold by the producer at harvest is usually bought on a liberal grade basis, each elevator having its own method of grading and applying discounts. A producer's harvest deliveries are usually averaged with price and discounts applied to the average grade. Wheat brought to the elevator after

harvest is graded by the truckload or an average of truckloads delivered at that time. Wheat is bought as U.S. grade number one minus discounts. Wheat bought and sold at levels after the local level are based on official U.S. grades and standards with published premiums and discounts. Actual grading may be conducted by a qualified third party or the Federal Grain Inspection Service.

Post-sale shipment and remote market access are other characteristics currently used when trading hard red winter wheat. The majority of the grain trades are made via the telephone. Final destination of wheat is ordinarily known before it leaves the local elevator. Remote market access currently exists because neither buyers nor sellers are required to be physically present at one location for a trade to take place.

Since grain electronic marketing has never been attempted, organized trading and centralization of sales by a single entity do not currently exist. Organized trading would include a set of written behavioral rules which apply to all participants. These rules must be known and enforceable. Centralization of sales by a single entity is also required. The electronic mechanism must be able to manage communications among a large number of market participants (buyers and sellers). Centralization of sales could occur regionally or on a nationwide basis.

Volume seems to be the major factor in determining whether past electronic systems have been cost efficient and successful. Lack of sufficient volume was considered the major reason for termination of HAMS, CATTLEX, and CATS. It is not clear that two commercial systems,

ECI and NEMA, have achieved sufficient trading volumes to assure an adequate profit for long term viability.

One potential problem with electronic market's supplying updated market information may be shown through an Egg Clearinghouse, Inc. experience. Participants in ECI have used the system to evaluate trading alternatives. Sellers have shown a tendency to accept only higher prices on the computer system and to take relatively lower prices in private. Information about these private trades is not available to ECI; consequently their success in providing market information based on negotiated trades has been limited.

It has been stated that electronic marketing has the potential to eliminate or reduce spatial imperfections and pricing problems present in thin markets. The potential to increase both technical and pricing efficiency also exists with electronic marketing.

The term "thin markets" is used to describe markets with little trading volume and liquidity. Prices on thin markets are often erratic. Thus, prices on thin markets may not represent the true value of the product. As individual traders discover that they can affect the market price by offers to buy or sell, prices established on thin markets may be subject to manipulation. Thin markets do not appear to be a problem in the grain industry.

Electronic markets may have the potential to improve technical and price efficiency. Technical efficiency may increase due to centralization of trading without necessary movement of buyers, sellers, and/or the products to a common location. Since wheat is seldom shipped until the buyer is known and the delivery point decided, increased technical efficiency may not be possible for wheat. A

potential for increased pricing efficiency may, however, exist through electronic marketing. Price behavior may be altered because of greater competition, improved information, and expanded market access.

Summary of Results

Data for this study were collected through surveys. Two hard red winter wheat producer and two elevator surveys were conducted. Producer surveys consisted of a personal interview with wheat producers in Oklahoma, Kansas, and Nebraska and a survey to a random sample of wheat producers in Oklahoma and Kansas. Grain elevator surveys consisted of a mailed survey to a random sample of federally inspected warehouse managers and a mailed survey to all officers and directors of state grain and feed associations. All surveys were conducted in areas west of the Mississippi River.

A t-test was used to determine whether responses from the two producer and two elevator surveys could be combined. Comparisons between producer and elevator responses were made through the use of a chi-square test. Chi-square is a test of association. Use of this test determined the probability that producers responded in the same manner as elevators.

A series of questions was used to determine the need for electronic marketing. These questions also helped to determine what characteristics in an electronic marketing system would be important to producers and elevators. Characteristics available through electronic marketing included: 1) pricing characteristics, 2) information services, 3) descriptive characteristics, 4) storage and transportation services, 5) operational characteristics, and 6) a section of questions

concerning use of an electronic system and the amount of time it would take for the system to become operational.

One question asked respondents to indicate the need for electronic marketing of grains. Producers had a response mean of 3.50 compared with a response mean of 2.72 from elevators. Producers seem to favor any concept that might potentially increase their market position. Elevators, on the other hand, may prefer the current method for buying and selling grain. The element of personal contact, either through a phone conversation or on a one-on-one basis, may be a part of merchandising that elevators are unwilling to forego.

Potential pricing characteristics offered through electronic marketing were analyzed. The importance of producers offering grain at a set price and waiting until a buyer bid that amount was compared with the importance of elevators bidding on grain based on the producer's asking price. Elevators thought this characteristic was less important than producers. Elevators may see this as unrealistic because they are basically locked into the price offered to producers.

The average producer thought the ability to have grain auctioned to the highest bidder was moderately important. The average elevator, on the other hand, foresaw an auction market as less than moderately to moderately important. Producers seem to express a desire for a more active role in the pricing process.

Both producers and elevators thought the ability to make frequent changes in asking or offer prices was moderately to greater than moderately important. Neither wanted to get trapped into an inescapable position during sudden and/or drastic market changes.

Information services offered to producers and elevators through electronic marketing included: 1) improved access to details of most recent trades, 2) improved access to summaries of all sales and purchases, 3) improved access to forward contract offers from producers and bids from buyers, and 4) improved access to other market information. The average producer thought that having access to these services was greater than moderately important. Elevators thought these services were moderately to greater than moderately important.

Producers may desire these services at a local level rather than a national level. Elevators were less favorable than producers. Most elevators currently have some type of information service. Both survey groups could see a need for improvement in quantity, quality, timing, and accuracy of information.

Producers and elevators were surveyed on the importance of buying and selling grain on descriptive characteristics. Both groups agreed that the following characteristics were moderately to greater than moderately important: location (FOB a specific point), delivery conditions, quantity, moisture, broken kernels, defects, and DHV. Disagreement between producer and elevators existed with respect to the importance of the descriptive characteristics: U.S. grade, protein, heat damage, total damage, test weight, and foreign material.

Producers ranked all descriptive characteristics the same, while elevators were more selective. Elevators ranked U.S. grade well above the other characteristics. This could be because U.S. grade includes all characteristics except protein. Since most wheat is currently sold by description, describing grain should not hender converting to an electronic marketing system.

Storage and transportation services available to producers through electronic marketing include the ability to: 1) locate available storage for grain, 2) offer grain to elevators for a set storage fee, 3) locate transportation for moving grain, and 4) negotiate freight rates. Producers viewed these characteristics as moderately to greater than moderately important. The ability to locate transportation and storage services electronically and to have this information readily available is attractive to producers.

Transportation services offered to elevators included the ability to: 1) locate truck transportation, 2) locate rail transportation, 3) locate barge transportation, and 4) negotiate freight rates. Elevators hypothesized these services as less than moderately to moderately important. Freight rates are currently negotiated privately with a rule of secrecy understood by all participants. These rates could still be established electronically and secretly. The fear of others accessing that information either legally or illegally, however, may detour many from being totally supportive of this service.

Operational characteristics common to producer and elevator surveys included the ability to: 1) market grain knowing that buyer and seller performance is guaranteed, 2) send and receive electronic mail, and 3) use the computers for other consumer services. Performance guarantees were important to both survey groups. They are a way of minimizing risk. Without performance guarantees, lack of participation may occur in a newly developed electronic market.

Elevators were less favorable toward the ability to send and receive electronic mail. They may fear the possibility of important documents being illegally tampered with. Producers and elevators saw

the ability to use computers for other consumer services as less important. They are not willing to pay for a service not frequently used. Results suggest that the fewer extras the better, at least in the initial stages of development.

The surveys included a section of questions on use of electronic marketing and the perceived time period before a system might become operational. Two questions asked the extent of agreement that grain and transportation services will be bought and sold electronically within five years. Results indicated that producers foresee a change to computers within the near future. Elevators showed less agreement in computerized trading within five years. These elevators may hypothesize current marketing methods as efficient.

Producers think local elevators will use a grain electronic market. Elevators are uncertain or have no opinion toward use of an electronic trading system. Producers may view their local elevator as progressive and willing to make changes in merchandising methods for grain. Lack of familiarity by elevators may cause them to have a hard time conceptualizing operation of a computerized trading system.

Producers and elevators tended to agree they would use a computerized information system. Producers showed a desire to have access to an information system that would constantly update needed information. Most elevators currently use a computerized information system. If a new information system were developed, that system would have to supply information above and beyond what is currently accessed in order to convince elevators to change from the information system currently used.

Benefit from electronic marketing to sellers of grain was analyzed. Producers agreed that producers, elevators, and brokers would all benefit. Elevators tended to agree that brokers would benefit, but showed reluctance toward producers and elevators benefiting from electronic marketing.

Benefits to buyers of grain were also analyzed. Producers thought livestock feeders, local elevators, grain millers and processors, and feed mills would all gain moderate to greater than moderate benefit from an electronic marketing system. Elevators answered that millers and processors would gain greater than moderate benefit, but perceived less benefit going to livestock feeders or other farmers, local elevators, and feed mills.

A final section of the surveys researched who might potentially be involved in a grain electronic market. Producers and elevators basically agreed on who should be responsible for the functions involved in operating an electronic market. One difference resulted when respondents were asked who should own and operate an electronic market. Producers showed preference of ownership and control by producers or producer trade associations. Elevators preferred a private third party firm own and control the system.

Producers and elevators agreed that producers or producer trade associations should guarantee delivery of grain. They thought buyers or buyer trade associations should be responsible for guaranteeing payment. They also agreed that producers should guarantee quality and a private third party firm should be responsible for resolving disputes.

Responses to the process of describing and grading grain were fairly evenly divided. A private third party firm was the opinion of 36 percent of producers and elevators. Producers preferred producers or producer trade associations second. Elevators, on the other hand, showed second preference to buyers or buyer trade associations or the government describing and grading grain.

Conclusions

Producers overall responses were more favorable toward electronic marketing than elevator responses. Several reasons for this may exist. First, producers seem to favor any concept that might potentially increase their market position. Elevators may think the current marketing system is efficient.

It may be further assumed that the producers answering the survey were more progressive and interested in improving their marketing techniques. This assumption is made because the two highest wheat producing counties in Oklahoma and Kansas were selected for the personal interview. The cover letter attached to the follow-up mail survey to producers also supports this. Thirty respondents to the follow-up mail survey were not interested in grain marketing and therefore did not fill out the survey. Thirty-four did not fill out the survey because they did not know about grain electronic marketing. This suggests that producers who responded to the survey were interested in actively marketing their own wheat.

Producers and elevators might be willing to participate in a program where benefits exceed costs. A computerized trading system has

never been attempted for grains. Early innovators will need to exist to provide integrity in the system before others will participate.

It may be necessary, initially, to develop a grain electronic marketing system at the elevator level or above. This system could be designed so that it could be later adapted for use by wheat producers. The primary reason for this is based on the survey question asking how much the respondent would be willing to pay per month for the use of such a system. Producers from the personal interview responded $68 per month. The average response from the federally inspected grain warehouse managers was $219 per month and $358 per month was the average response from the officers and directors. Costs to access a computerized system and trade over that system may be in excess of what producers are willing to pay.

Recommendations for Further Research

Electronic marketing of grain is a fairly new concept. As with any new idea, changes will occur as problems arise. Further research into elements that may have led to success or failure of past electronic systems might alleviate some of these problems. Recognition of these elements may also help to foresee problems before they occur. By making necessary adjustments or taking needed precautions, the risk of failure of a grain electronic market may be reduced.

Results from the surveys showed that hard red winter wheat producers were generally more favorable toward electronic marketing than elevators. According to Ethridge, electronic markets address two basic producer marketing problems--noncompetitve isolated local markets and lack of detailed price information. He also states that the

primary objectives of elèctronic markets have been to increase producer access to potential buyers and to provide reliable and timely market news.

Additional research is needed to determine the feasibility of designing an electronic market to meet the needs of producers. This study might include a detailed cost analysis. An electronic market designed for producers might also include a complete information system with constantly updated local, national, and futures prices.

A SELECTED BIBLIOGRAPHY

Bell, James B., Dennis R. Henderson, David L. Holder, Wayne D. Purcell, James R. Russell, Thomas L. Sporleder, and Clement E. Ward. Electronic Marketing: What, Why, How. Virginia Cooperative Extension Service, publication 448-003, November 1983.

Bradley, Cindy J., Kim B. Anderson, and James R. Russell. Attitudes of Wheat Producers and Elevator Managers Toward Electronic Marketing of Wheat and Transportation Services. Agricultural Experiment Station Research Report P-852, Oklahoma State University, October 1984.

Caves, Richard E. "Industrial Organization and the Problem of Thin Markets." Pricing Problems in the Food Industry (With Emphasis on Thin Markets), ed. Marvin L. Hayenga, pp. 19-29, 7NC117, February 1979.

Cox, Meg. "Egg Clearinghouse, Inc., Despite Its Size, Plays a Big Role in Determining Prices." Wall Street Journal, March 6, 1978.

Engleman, Gerald, David Holder, and Allan Paul. The Feasibility of Electronic Marketing for the Wholesale Meat Trade, AMS and ESCS, USDA, ASM-583, May 1979.

Ethridge, Don E. "A Computerized Remote-Access Commodity Market: Telcot." Southern Journal Agricultural Economics. 10(1978):177-82.

Green, Paul E. and Donald S. Tull. Reasearch for Marketing Decisions, 4th ed. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1978.

Greensted, C. S., A. K. S. Jardine, and J. D. MacFarlane. Essentials of Statistics in Marketing. London: Heinemann, 1974.

Hayenga, Marvin L., Bruce L. Gardner, Allen B. Paul, and James P. Houck. "The Concept of a Thin Market." Pricing Problems in the Food Industry (With Emphasis on Thin Markets), ed. Marvin L. Hayenga, pp. 7-13, 7NC117, February 1979.

Helmreich, D. P., J. E. Epperson, L. C. Moon, D. H. Carley, C. L. Huang, and S. M. Fletcher. Settings for an Agricultural Multicommodity Computerized Exchange, Georgia Agricultural Experiment Station Bulletin 273, March 1982.

Henderson, Dennis R. "Electronic Marketing in Principle and Practice." Draft. Ohio State University, July 1984.

Henderson, Dennis R. Electronic Markets for Agricultural Commodities: Potentials and Pitfalls, Ohio State University, North Central Regional Research Project 117, WP-62, April 1982.

Henderson, Dennis R. Some Considerations in the Application of Electronic Marketing to Meat, Ohio State University, North Central Regional Research Project 117, WP-35, July 1979.

Henderson, Dennis R., ed., Proceedings of the National Symposium on Electronic Marketing of Agricultural Commodities, MP-1463, Texas A&M University, March 1980.

Henderson, Dennis R. and E. Dean Baldwin. "Marketing Slaughter Hogs by Remote-Access Computerized Auction: Theory and Empirical Results." Paper presented at the annual meeting of the American Agricultural Economics Association, Clemson, South Carolina, July 1981.

Henderson, Dennis R., Lee F. Schrader, and Michael S. Turner. "Electronic Commodity Markets." Marketing Alternatives for Agriculture. Is There a Better Way? Olan D. Forker, V. James Rhodes, and Ellen M. Bonns, eds. National Public Policy Education Committee Publication Number 7, Gornell University, November 1976.

Miller, Lisa D. and Paul Hummer. Analysis of Operational Goals, Procedures and Conflicts in the Oklahoma Wheat Industry. Agricultural Experiment Station Bulletin B-774, Oklahoma State University, May 1984.

Peer, D. "Pricing Systems for Hogs in Ontario," lecture, University of Guelph, Agricultural Economics and Extension Education, October 22, 1976.

Rhodes, V. James. "Current Policy Issues Regarding Commodity Pricing Systems." Paper presented at the American Agricultural Economics Association Symposium, "Commodity Pricing Systems: Issues and Alternatives," Pullman, Washington, July 31, 1979.

Roscoe, John T. and Jackson A. Byars. "An Investigation of the Restraints with Respect to Sample Size Commonly Imposed on the Use of the Chi-Square Statistic." Journal of the American Statistical Association. 66(1971)755-759.

Russell, James R. "Electronic Marketing: Conceptual, Theoretical, and Empirical Considerations." Ph.D. dissertation, Virginia Polytechnic Institute and State University, December 1981.

Russell, James R. and Wayne D. Purcell. "Costs of Operating a Computerized Trading System for Slaughter Lambs." Southern Journal of Agricultural Economics. 15(1983):123-127.

Russell, James R. and Wayne D. Purcell. "Implementation of Electronic Marketing of Slaughter Cattle in Virginia: Requirements and Procedures." Southern Journal of Agricultural Economics. 7(1980)77-84.

Russell, James R. and Wayne D. Purcell. Interviews with Virginia Slaughter Cattle Producers and Eastern Packers: Implications to Electronic Marketing, MB-277, Agricultural Economics, Virginia Polytechnic Institute and State University, August 1979.

Russell, James R. and Wayne D. Purcell. "Participant Evaluation of Computerized Auctions for Slaughter Livestock - The Experience with Electronic Marketing Association, Inc." North Central Journal of Agricultural Economics. 6(1984):8-16.

Russell, James R. and Clement E. Ward. "Oklahoma Lamb Teleauction Update and Marketing by Computer", OSU Extension Facts 460, Oklahoma State University, November 1982.

Sarhan, M. E. and K. E. Nelson. Electronic Meat Trading: An Alternative Mechanism for Wholesale Meat in the United States, National Economics Division, Economics and Statistics Service, United States Department of Agriculture Staff Report, April 1981.

Schlei, Barbara L. "Electronic Trading of Agricultural Products." Paper delivered to the Commonwealth Club, San Francisco, California, July 8, 1980.

Snedecor, George W., and William G. Cochran. Statistical Methods, 7th ed. Ames: The Iowa State University Press, 1980.

Sporleder, Thomas L., ed., Proceedings of the National Symposium on Electronic Marketing of Agricultural Commodities, MP-1463, Texas A&M University, March 1980.

Sporleder, Thomas L. and Ernest E. Davis. CATTLEX: A Computerized Cash and Contract Market for Feeder and Stocker Cattle, Technical Report 81-3, Department of Agricultural Economics, Texas A&M University, April 1981.

Turner, S. C., J. E. Epperson, and S. M. Fletcher, "Producer Attitudes Toward Multicommodity Electronic Marketing." American Journal of Agricultural Economics. 65(1983):818-822.

Ward, Clement E. "An Empirical Study of Competition in the Price Discovery Process for Slaughter Lambs." Western Journal of Agricultural Economics. 9(1984).

Ward, Clement E. "Marketing Oklahoma Feeder Cattle by Video Auction." OSU Extension Facts 463, Oklahoma State University, February 1983.

Ward, Clement E. "Marketing Oklahoma Lambs by Teleauction." OSU Extension Facts 456, Oklahoma State University, October 1980.

Ward, Clement E., ed., Proceedings of the National Symposium on Electronic Marketing of Agricultural Commodities, MP-1463, Texas A&M University, March 1980.

Ward, Clement E. and James R. Russell. "Electronic Marketing in Oklahoma - Experience and Opportunities." OSU Extension Facts 475, Oklahoma State University, July 1984.

APPENDIXES

APPENDIX A

PRODUCER PERSONAL INTERVIEW QUESTIONAIRE WITH SUMMARY STATISTICS

ID No. _____
(Co. - Person)

Form I
July 1983

OKLAHOMA STATE UNIVERSITY

DEPARTMENT OF AGRICULTURAL ECONOMICS

A STUDY OF GRAIN MARKETING

Name _____ Interviewer _____

Address _____ Date Time
(Rural Route)

1st call _____ _____

_____ 2nd call _____ _____
(City)

3rd call _____ _____

Phone _____ _____ Starting Time _____
(Area Code)

Sex (M) (F)

Hello, I am _____ (state name) and I am working for Oklahoma State University at Stillwater. The Department of Agricultural Economics at Oklahoma State is doing research on marketing alternatives for grain producers. As a part of this project, we are contacting farmers to find out what types of marketing systems are being used and what changes are being made or should be made to assure that markets are efficient and competitive. Particular emphasis will be placed on electronic marketing potential. Knowledge gained from this study will help advise grain producers about production and marketing practices. All information will be kept confidential and used only for research purposes. Your assistance will be greatly appreciated.

Did you produce any grain in 1982?

_____ Yes (go to page 2)

_____ No (stop)

SECTION I. GENERAL FARMING OPERATION

First, we would like some general information about your farming operation in 1982.

1. (a) How many acres of land did you own in 1982? Include land owned by your wife, or by your partners, if any. 547 (Average)

   (b) Of these _____ (entry in a) acres, how many did you rent to others in 1982? 36 (Average)

   (c) Acres operated which you own (a - b) 523 (Average)

   (d) How many acres of land did you rent from others and operate in 1982? Include any land operated in partnership or as a corporation. 666 (Average)

   (e) Now this makes a total of 1138 acres operated in 1982. (Average)

   (f) What is your on-farm grain storage capacity? 18,858 (Average) bushels

   (g) Do you expect to increase your on-farm grain storage capacity in the next five years? 16 Yes 35 No 3 Maybe (Frequency)

2. (a) Now we would like to ask about the uses made of your _____ (entry in 1.e) acres during 1982. How many acres did you have in _____ (insert use).

   (b) For each of the grains listed, how much would you expect to produce per acre in an average year? _____

   (c) What percentage of each of the grains you produce is sold off the farm as grain in an average year.

   NOTE: Record crops by total acres if respondent recalls totals, OR if respondent reports by tract, record separately.

	Land Use	Total acres in operation	1st tract	2nd tract	3rd tract	Avg. Yield /acre	Percentage Sold Off the Farm as grain
(a)	Corn for grain.	440				117	93
(b)	Soybeans.	562				40	100
(c)	Wheat	695				42	91
(d)	Milo for grain.	86				38	67
(e)	Hay	61				80	50
(f)	Cotton.	0				0	0
(g)	Government program (diverted) . .	188				---	--
(h)	Rice.	0				0	0
(i)	Grain for silage.	43				103	50
(j)	Other cropland _____ (specify) . .	60				62	--
(k)	Permanent Pasture	340				---	--
(l)	Farmstead, roads, wasteland, etc.	28				---	--
	TOTAL ACRES (See 1e above)						

3. Do you own or use a computer in your farm business? (Frequency)
   5 (9%) Yes 49 (91%) No (Skip to Question 4)
   What type? _____

4. Do you plan to purchase or use a computer in your business within the next two years? (Frequency)
   6 (12%) Yes 29 (58%) No 15 (30%) Maybe

SECTION II. GRAIN OUTLETS

Now we would like to talk about the outlets where you delivered or sold grain during 1982.

1. (a) Would you please tell me the name and city of each outlet to which you delivered or sold grain in 1982?

   (b) What percentage of your 1982 grain has not yet been sold 27 ? (Average)

   [For each market named, ASK]:

   (c) What percentage of the grain delivered or sold in 1982 was delivered or sold to _____?

   (d) At the bottom left of this page is a list of different types of market outlets. What type of market outlet was used?

   (e) At the bottom right of this page is a list of methods used to haul grain to market. What hauling method was used?

   (f) How far is this outlet from the farm from which you delivered the grain? _____

Table 2.

	(a)	(c) (Average)	(d)	(e)	(f) (Average)
Name	City	Per-centage	*Type of market	** Hauling method(s)	Distance from farm (mi.)
1		65%			8
2		36%			10
3		21%			16
4		32%			29

INTERVIEWER: Record code number(s) only for Cols. c and d. You may have more than one entry in these two columns.

*Type of market(s)

1 - local elevator
2 - grain processor
3 - grain exporter
4 - subterminal elevator
5 - another farmer (livestock producers)
6 - feed mill
7 - inland terminal
8 - gulf elevators
9 - other _____

**Hauling method(s)

1 - pickup truck
2 - pickup truck with trailer
3 - straight truck
4 - straight truck with trailer
5 - semi-trailer
6 - tractor and wagon
7 - other _____

(g) How many outlets did you consider using in 1982 but did not use? .50 (Average)

Several of the following questions are to be answered by using numerical scores you select from the range of "1" to "99". The numbers "1" and "99" represent extremes -- in importance, or in the degree of your agreement with a statement, or the like. If the attribute being indicated is of importance, a "1" means that it is of no importance, while a "99" means it is highly important.

In many instances you may want to indicate intermediate degrees by using scores between "1" and "99". On the "importance" scale, with a score of "1" indicating no importance and "99" indicating much importance, scores between "10" and "30" might be conceived of as indicating slight importance, scores between "40" and "60" as indicating moderate importance, and scores between "70" and "90" as indicating considerable but not maximum importance.

The distinctions you make should be as fine as you feel you can make them. Use the number along the range that you believe best expresses your judgment. If you feel you can distinguish between "50" and "52", do so. If you do not feel you can distinguish that finely, you may use scores that are multiples of "5" or "10". A check mark (x) indicates no opinion, undecided, or do not know.

2. Listed below are characteristics of markets that might influence you to choose a particular market outlet when selling grain. You have said that in 1982 you delivered grain to_____ (read markets given in Q. 1). For each factor please indicate by giving me a number from "1" to "99", how important it was to you in deciding to patronize these outlets.

(Average)

Importance of Market Characteristics

The following scale may help keep the directions in mind

1	10	20	30	40	50	60	70	80	90	99
Not important				Moderately important					Highly important	

	Characteristics of Market	Degree of Importance
(a)	price received	80
(b)	convenient transportation	78
(c)	marketing cost	69
(d)	elevator is a cooperative	48
(e)	elevator is not a cooperative	35
(f)	speed and convenience of unloading the truck	71
(g)	reliability of the elevator management commitments	82
(h)	sale of farm input (fuel, fertilizer, etc.)	64
(i)	attitude of manager and employees	79
(j)	farm pickup of grain by the elevator	31
(k)	availability of storage facilities	75
(l)	Premium and discount schedules	66
(m)	Availability of forward contracts	56

SECTION III. MARKETING OBJECTIVES AND DECISIONS

1. (a) When you get ready to sell grain, from how many buyers do you usually obtain bids or price quotations? 2 (Average)

   (b) How soon after the grain price changes by more than 5 cents do you hear about the change?
   _____ Minutes 8 Hours _____ Days (Average)

   (c) How soon after learning of the above market change would you be able to sell grain if you so desired?
   97 Minutes _____ Hours _____ Days (Average)

2. Listed below are several possible sources of marketing information. Please indicate, by giving number from "1" to "99", how important each source is to you (prompt response by reading sources). (Average)

Importance of Marketing Information Sources

The following scale may help keep the directions in mind

1	10	20	30	40	50	60	70	80	90	99
Not important					Moderately important					Highly important

a.	radio	76
b.	television	49
c.	newspaper	38
d.	farm magazines	38
e.	marketing newsletters	37
f.	wire service or teletype	43
g.	computerized information sources	29
h.	personal contacts	56

3. When deciding to market your grain, several different types of information may be important. Please indicate, by giving a number from "1" to "99", how important each type of information listed below is to you when making a selling decision. (Average)

Importance of Marketing Information

The following scale may help keep the directions in mind

1	10	20	30	40	50	60	70	80	90	99
Not important					Moderately important					Highly important

a.	recent price trend over the last one to three weeks	62
b.	export activity and prospects	64
c.	crop estimates and carryover figures	53
d.	futures prices	60
e.	local elevator price the day of the sale	82
f.	private market analyst's expectations	39
g.	government or university market analysts	37
h.	storage available	50
i.	volume of grain being sold from your local area	41
j.	government loan price for 1982	58
k.	opinions of neighbors and friends	32
l.	consultation with bankers	39
m.	consultation with brokers	21

4. Generally, producers have objectives when marketing grain. Please indicate by giving a number from "1" to "99" how important each of the following listed below is in making marketing decisions.

(Average)

Importance of Marketing Objectives

The following scale may help keep the directions in mind

1	10	20	30	40	50	60	70	80	90	99
Not important					Moderately important					Highly important

a.	obtain the top price	91
b.	minimize storage costs	69
c.	reduce risk of adverse price change	66
d.	maximize annual profit	80
e.	avoid income fluctuations and high tax brackets	61
f.	meet loan payments	65
g.	other _____	

5. Causes of market inefficiency, if any, can be related to prices not reflecting the value of products or high grain handling costs. Please indicate, by giving a number from "1" to "99", the relative importance of each of the factors listed below as factors causing markets to be inefficient. (Average)

Importance of Factors Causing Inefficiency

The following scale may help keep the directions in mind

1	10	20	30	40	50	60	70	80	90	99
Not important					Moderately important					Highly important

a.	lack of market information	56
b.	not enough competition among buyers for your grain	70
c.	lack of proper grading specifications, premiums and discounts at local elevators	59
d.	unanticipated variations in the price of grain	60
e.	lack of available transportation facilities	43
f.	other _____	

6. Producers can market grain several different ways. During 1982, approximately what percentage of your grain did you sell or do you plan to sell using each of the methods listed below. (Average)

		Corn	Wheat	Soybeans
a.	Sell at harvest (no prior contract)		16	
b.	Forward contract for cash sale at harvest		6	
c.	Store on the farm and deliver later (no prior contract)		12	
d.	Store on the farm with a contract for later delivery		13	
e.	Store off the farm and sell later (no contract)		35	
f.	Store off the farm with a contract for later sale		10	
g.	Other _____		6	

7. Did you use the futures market to price any of the grain you sold?
Yes 11 No 43 (Frequency)

SECTION IV. ELECTRONIC MARKETING

(READ): Electronic marketing involves using various forms of communication and data processing technology to market agricultural commodities. Buyers and sellers trade commodities with the aid of conference telephones, video tape equipment, microcomputers, or computer terminals connected to large (main frame) computers. The objective of electronic markets is to create a centralized trading arena where all potential buyers and sellers can compete and finalize trades. Commodities are sold based on description. Often, commodities remain on the farm until the sale is completed and an acceptable price is established. Electronic markets have been tried for feeder pigs, slaughter hogs, feeder cattle, slaughter cattle, slaughter lambs, wholesale meat, eggs, cotton, and hay. Some electronic marketing systems are operated commercially, while others have not been successful.

Familiarity With Electronic Marketing

The following scale may help keep the directions in mind

1	10	20	30	40	50	60	70	80	90	99
Not familiar				Moderately familiar					Highly familiar	

1. Please indicate on a scale of "1" to "99" how familiar you were with electronic marketing before this interview began? 34 (Average)

2. Have you marketed commodities by an electronic marketing method? (Frequency)
   6 (11%) Yes 47 (89%) No
   a. What method? _____
   b. What commodity? _____

3. Are you aware of other producers who have marketed their commodities by an electronic marketing method? 16 (30%) Yes 38 (70%) No (Frequency)
   a. What method? _____
   b. What commodity? _____

4. If an electronic market for selling your grain was available, how would you rate the importance of each of its potential pricing characteristics? Please indicate by giving a number from "1" to "99" to reflect the relative importance of each of the characteristics listed below. (Average)

Importance of Potential Pricing Characteristics

The following scale may help keep the directions in mind

1	10	20	30	40	50	60	70	80	90	99
Not important				Moderately important					Highly important	

Potential Pricing Characteristics	
a. Producers could offer their grain at a set price and wait until a buyer bid that amount	68
b. Producers could offer to forward contract their grain at a set price and wait until a buyer bid that amount	69
c. Producers could have their grain auctioned to the highest bidder	54
d. Producers could place a reservation or floor price (unknown to buyers) on their grain	65
e. Producers could change their reservation or floor price as frequently as they wish	64
f. Producers could place futures market orders	61
g. Producers could offer their grain to more buyers	78
h. Other _____	

5. If an electronic market for selling your grain was available, how would you rate the importance of each of its potential information services. Please indicate by giving a number from "1" to "99" to reflect the relative importance of each of the information services listed below. (Average)

Importance of Potential Information Services

The following scale may help keep the directions in mind

1	10	20	30	40	50	60	70	80	90	99
Not important					Moderately important				Highly important	

a.	Producers could have access to details of the most recent individual trades	76
b.	Producers could have access to summaries of all trades	76
c.	Producers could have access to cash price bids from buyers	82
d.	Producers could have access to forward contract bids from buyers	77
e.	Producers could have access to other market information:	
	1. currency exchange rates	60
	2. news, general	63
	commodity	75
	3. prices, local	73
	national	72
	world	72
	futures	73
	forecast	67
	4. trade leads	65
	5. transportation rates	66
	6. USDA reports	59
	7. weather, local	66
	national	66
	world	62
	8. other _____	

6. If an electronic market for selling your grain was available, how would you rate the importance of each descriptive characteristic? Please indicate by giving a number from "1" to "99" to reflect the relative importance of each of the descriptive characteristics listed below. (Average)

Importance of Descriptive Characteristics

The following scale may help keep the directions in mind

1	10	20	30	40	50	60	70	80	90	99
Not important					Moderately important				Highly important	

Producers could sell their grain based on the following descriptive characteristics:

a.	location (FOB a specific point)	74
b.	delivery conditions	76
c.	quantity	73
d.	moisture	73
e.	U. S. grade	73
f.	protein	76
g.	percent oil (soybeans)	70
h.	heat damage	67
i.	total damage	71
j.	broken kernels	61
k.	test weight	73
l.	foreign material	71
m.	defects	66
n.	DHV	61
o.	other _____	

7. If an electronic market was available to sell you grain, how would you rate the importance of each of its potential storage and transportation services? Please indicate by giving a number from "1" to "99" to reflect the relative importance of each of the storage and transportation services listed below.

(Average)

Importance of Potential Storage and Transportation Services

The following scale may help keep the directions in mind

1 10 20 30 40 50 60 70 80 90 99

Not important — Moderately important — Highly important

a.	Producers could locate available storage for grain	64
b.	Producers could offer grain to elevators for a set storage fee	69
c.	Producers could locate transportation for moving their grain	63
d.	Producers could negotiate freight rates for grain to be shipped	69
e.	Other _____	

8. If an electronic market was available to sell your grain, how would you rate the importance of each of its potential operational characteristics? Please indicate by giving a number from "1" to "99" to reflect the relative importance of each of the operational characteristics listed below. (Average)

Importance of Potential Operational Characteristics

The following scale may help keep the directions in mind

1 10 20 30 40 50 60 70 80 90 99

Not important — Moderately important — Highly important

a.	Producers could market grain knowing that buyer performance is guaranteed	84
b.	Producers could access the trading system from their home (with a telephone and computer terminal or microcomputer)	79
c.	Producers could access the trading system from a local agribusiness (elevator, lender, farm supply dealer, etc.)	74
d.	Producers could send and receive electronic mail	63
e.	Producers could use the computers for other consumer services (airline reservations, catalog shipping, etc.)	55
f.	other _____	

9. There are several potential grain sellers and buyers as well as other firms that could be involved in an electronic market for grain. Please indicate on a scale of "1" to "99" how much you feel each of the groups listed below may benefit from an electronic market for grain? (Average)

Benefit for Grain Buyers and Sellers

The following scale may help keep the directions in mind

1 (No benefit) 10 20 30 40 50 (Moderate benefit) 60 70 80 90 99 (Great benefit)

a.	Sellers:	
	1. grain producers	77
	2. elevators	79
	3. broker	72
b.	Buyers:	
	1. livestock feeders or other farmers	77
	2. local elevators	72
	3. grain millers and processors	74
	4. feed mills	73

10. Listed below are several groups which might be involved in an electronic market. If an electronic market for grains was formed, who should: (Frequency)

		Producers or producer trade assns.	Buyers or buyer trade assns.	Private third party firms	Govern-ment	Other
a.	own and control the system	36	14	16	2	2
b.	guarantee delivery of grain	37	13	7	3	1
c.	guarantee payment	6	40	7	7	0
d.	describe and grade grain	17	17	18	7	0
e.	guarantee quality	35	8	13	4	1
f.	resolve disputes	11	9	28	7	4

Need for a Grain Electronic Marketing System

The following scale may help keep the directions in mind

1 (No need) 10 20 30 40 50 (Moderate need) 60 70 80 90 99 (Great need)

11. Please indicate on a scale of "1" to "99" how strong you feel the need is for an electronic marketing system for grains. 64 (Average)

Give the principle reasons why or why not: _____

12. Indicate the degree to which you agree or disagree with each of the statements listed below using a number from "1" to "99". (Average)

Extent of Agreement or Disagreement with Statement										
The following scale may help in keeping the directions in mind										
1	10	20	30	40	50	60	70	80	90	99
Strongly disagree					Uncertain or no opinion					Strongly agree

a.	I expect grain will be bought and sold through a computerized trading system within 5 years	71
b.	I expect transportation services will be bought and sold through a computerized trading system within 5 years	64
c.	I expect my local elevator will use a computerized trading system	72
d.	I expect I will use a computerized trading system	50
e.	I expect my local elevator will use a computerized information system	79
f.	I expect I will use a computerized information system	59

13. If in fact a system is developed on a cost-efficient basis, would you have one?
19 (36%) Yes 12 (23%) No 22 (41%) Maybe (Frequency)

14. How much would you be willing to pay per month for the use of such a system? ____
68 (Average)

SECTION V. ADDITIONAL INFORMATION ABOUT FARM AND FARM OPERATOR

Now could we have a little information about you, please?

1. (a)	In what year were you born? (Average)	1936
(b)	What is the highest grade of school you completed? (Average)	13
(c)	How many years have you farmed since your 18th birthday? (Avg.)	26
(d)	During how many of these _____ (entry in c) years have you produced (wheat/corn/soybeans)? (Average)	26
2.	What proportion of your gross farm income is derived from sale of grain? (Average)	70%

3. Do you produce livestock? Yes 46 (85%) No 8 (15%) (Frequency)

Thank you for yor time and cooperation.

Ending Time: _____

APPENDIX B

PRODUCER MAIL QUESTIONAIRE

WITH SUMMARY STATISTICS

OKLAHOMA STATE UNIVERSITY
DEPARTMENT OF AGRICULTURAL ECONOMICS
GRAIN PRODUCER SURVEY

Name _____ Address _____
(Rural Route)

_____
(City)

State _____

Sex M___ F___ County _____

1. (a) How many acres of land did you own in 1982? Include land owned by your wife, or by your partners, if any. 1254 (Average)

(b) How many acres did you rent to others in 1982? 157 (Average)

(c) How many acres of land did you or your partnership rent from others and operate in 1982? 710 (Average)

(d) What is your on-farm storage capacity? 18,071 bu. (Average)

(e) Do you expect to increase your on-farm grain storage capacity in the next five years? 25 Yes 47 No (Frequency)

(f) How many acres did you have planted in the following crops in 1982? (Average)

	Acres		Acres
Wheat	592	Government Program . .	242
Milo for grain. . .	99	Grain for silage . . .	9
Hay	65	Permanent Pasture. . .	597
Cotton.	11	Farmstead, roads, wasteland, etc. . .	23
		Other _____	147
		Total Acres.	1788

(Over)

Electronic marketing of cash commodities involves using various forms of communication and data processing technology. Buyers and sellers trade cash commodities with the aid of conference telephones, video tape equipment, microcomputers, or computer terminals connected to large (main frame) computers. The objective of electronic markets is to create a centralized trading arena where all potential buyers and sellers can compete and finalize trades. Commodities are bought or sold based on description. Electornic markets have been tried for feeder pigs, slaughter hogs, feeder cattle, slaughter cattle, slaughter lambs, wholesale meat, eggs, cotton, and hay. Some electronic marketing systems are operated commercially, while others have not been successful.

2. Please indicate how familiar you were with electronic marketing before this survey began? (Frequency)

28	23	17	2	2
Not Familiar	Less Than Moderately Familiar	Moderately Familiar	Greater Than Moderately Familiar	Highly Familiar

3. Have you bought or sold commodities by an electronic marketing method?
9 (13%) Yes 63 (87%) No (Frequency)
What commodity and method?(see above statement) _____

4. Are you aware of other producers who have bought or sold their commodities by an electronic marketing method? 20 (28%) Yes 51 (72%) No (Frequency)
What commodity and method?(see above statement) _____

5. If an electronic market for selling grain was available, how would you rate the importance of each of its potential pricing characteristics? Ability to: (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. offer grain at a set price and wait until a buyer bids that amount	5	3	24	19	20
b. forward contract grain at a set price and wait until a buyer bids that amount.	2	5	29	18	14
c. have grain auctioned to the highest bidder. .	11	12	22	12	12
d. place a reservation or floor price (unknown to buyers) on your grain.	2	6	25	18	18
e. change your reservation or floor price as frequently as you wish .	4	12	25	12	17
f. place futures market orders	9	8	21	14	16
g. offer grain to more buyers	1	0	5	15	47
h. Other _____					

6. If an electronic market was available, how would you rate the importance of each of its potential information services. (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Improved access to details of the most recent individual trades	2	3	17	23	27
b. Improved access to summaries of all trades	0	3	14	29	26
c. Improved access to cash price bids from buyers	0	1	7	26	38
d. Improved access to forward contract bids from buyers	1	1	16	23	29
e. Improved access to other market information:					
1. news general	3	9	24	17	17
commodity	1	1	17	26	26
2. prices, local	1	2	14	20	34
national	1	1	18	20	30
world	0	4	21	22	22
futures	1	5	17	21	25
forecast	3	5	21	16	25
3. transportation rates	1	3	25	16	25
4. USDA reports	4	13	14	20	21
5. weather	1	5	21	19	26
6. other _____					

7. If an electronic market was available, how would you rate the importance of each descriptive characteristic? Producers could sell their grain based on the following descriptive characteristics: (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. location (FOB a specific point)	1	2	24	16	29
b. delivery conditions	1	2	20	21	27
c. quantity	1	3	15	30	22
d. moisture	1	1	20	24	25
e. U. S. grade	0	0	20	29	22
f. protein	0	0	25	23	23
g. heat damage	0	4	20	23	24
h. total damage	0	1	19	27	24
i. broken kernels	1	7	31	18	13
j. test weight	0	0	22	27	22
k. foreign material	0	3	24	19	24
l. defects	2	4	27	19	17
m. DHV	1	6	29	15	12
n. other _____					

(Over)

8. If an electronic market was available, how would you rate the importance of each of its potential storage and transportation services? Ability to: (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. locate available storage for grain. . . .	4	9	29	12	18
b. offer grain to elevators for a set storage fee. .	4	8	29	19	12
c. locate transportation for moving your grain. .	4	4	25	19	20
d. negotiate freight rates for grain shipping . . .	3	3	21	20	24
e. Other _____					

9. If an electronic market was available, how would you rate the importance of each of its potential operational characteristics? Ability to: (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. market grain knowing that buyer performance is guaranteed	0	1	6	20	45
b. access the trading system from your home (with a telephone and computer terminal or microcomputer).	2	5	21	21	23
c. access the trading system from a local agribusiness.	1	2	26	24	19
d. send and receive electronic mail	6	14	25	15	11
e. use the computers for other consumer services (airline reservations-catalog shopping, etc.) .	18	18	22	6	7
f. other _____					

10. Listed below are several groups which might be involved in an electronic market. If an electronic market for grains was formed, who should: (Frequency)

	Producers or Producer Trade Assns.	Buyers or Buyer Trade Assns.*	**Private Third Party Firms	Govern-ment	Other
a. own and control the system	41	7	22	2	1
b. guarantee delivery of grain	53	9	11	2	1
c. guarantee payment	14	47	11	3	1
d. describe and grade grain	18	9	29	15	1
e. guarantee quality	53	5	10	2	1
f. resolve disputes	13	8	47	5	2

*Assns. = Associations

**The private third party firm would be an independent firm set up specifically to organize and control these functions.

11. Please indicate how strong you feel the need is for an electronic marketing system for grains. (Frequency)

0	13	23	23	10
No Need	Less Than Moderate Need	Moderate Need	Greater Than Moderate Need	Great Need

Give the principle reasons why or why not: _____

_____

(Over)

12. Rank how you agree or disagree with each of the following statements: (Frequency)

	Strongly Disagree	Disagree	Uncertain or no Opinion	Agree	Strongly Agree
a. Grain will be bought and sold through a computerized trading system within 5 years.	1	9	18	37	7
b. Transportation services will be bought and sold through a computerized trading system within 5 years.	1	14	25	25	6
c. Local elevators will use a computerized trading system	0	4	11	39	18
d. I will use a computerized trading system	2	15	32	18	5
e. Local elevators will use a computerized information system . . .	0	1	8	43	20
f. I will use a computerized information system . . .	0	10	32	22	8

(ADDITIONAL INFORMATION ABOUT FARM AND FARM OPERATOR)

1. (a) In what year were you born? (Average) 1933

   (b) What is the highest grade of school you completed? (Average) 13

   (c) How many years have you farmed since your 18th birthday? (Avg) 23

   (d) During how many of these _____ (entry in c) years have you produced wheat? (Average) 23

2. What proportion of your gross farm income is derived from the sale of grain? (Average) 63

3. Do you raise livestock? Yes 60 (83%) No 12 (17%) (Frequency)

APPENDIX C

COVER LETTER FOR FOLLOW-UP PRODUCER MAIL QUESTIONAIRE WITH SUMMARY STATISTICS

Wheat Producer:

Only 10 percent of the wheat producers responded to the grain electronic marketing survey. We are trying to determine whether this was due to a lack of interest or some other reason. We would appreciate your filling out the survey. If, however, you do not fill out the survey, please check one of the responses below and mail it back to us. (Frequency)

1. Not interested in grain electronic marketing . . 30
2. Don't know about grain electronic marketing. . . 34
3. Don't have time. 11
4. Retired. 56
5. Other* 28

All information is confidential and will be used for research purposes only. Each response is extremely important to our research. Thank you for your cooperation.

Sincerely,

Kim Anderson
Extension Economist

Cindy Bradley
Research Assistant

*Other responses included: deceased, rents, and does not farm.

APPENDIX D

FEDERALLY INSPECTED WAREHOUSE QUESTIONAIRE WITH SUMMARY STATISTICS

OKLAHOMA STATE UNIVERSITY
Agricultural Experiment Station
Department of Agricultural Economics
Stillwater, Oklahoma 74078

LOCAL GRAIN ELEVATOR SURVEY

1. a. Name of firm: _____
   b. Type of organization: Cooperative 22, Independent 27 (Frequency)
   c. Type of facility: Local 47, Inland Subterminal 2, Inland terminal 1, Export 0 (Frequency)

2. Please list the names and locations of branch elevators or stations:

Name	Locations

3. Person completing survey: Name _____
   Position _____
   Address _____
   _____
   Phone and area code: ( ) _____

4. What was your total grain storage capacity as of July 1, 1982? 1,088,709 (AVG) bu. (38,747 - 5,603,501)*

5. What percentage of the grain delivered to your elevator in 1982 was delivered during the 1982 harvest? 76 % (AVG)

6. a. During 1982, approximately how many bushels of grain did you handle? 1,358,862 (AVG)
   b. During 1982, approximately what percentage of your total grain volume handled was: (AVG)

Wheat	53 %
Corn	25 %
Soybeans	12 %
Other	25 %
Total	100 %

7. What is the radius of your grain procurement area? 25 miles (AVG) (4-250)*

8. How many other grain handling elevators are within your procurement area? 5 (AVG) (0-12)*

9. During 1982, approximately how many producers did you buy grain from? 208 (AVG) (10-1400)*

10. During 1982, approximately how many producers did you store grain for? 169 (AVG) (2-1,250)*

*Range

(over)

Electronic marketing of cash commodities involves using various forms of communication and data processing technology. Buyers and sellers trade cash commodities with the aid of conference telephones, video tape equipment, microcomputers, or computer terminals connected to large (main frame) computers. The objective of electronic markets is to create a centralized trading arena where all potential buyers and sellers can compete and finalize trades. Commodities are bought or sold based on description. Electronic markets have been tried for feeder pigs, slaughter hogs, feeder cattle, slaughter cattle, slaughter lambs, wholesale meat, eggs, cotton, and hay. Some electronic marketing systems are operated commercially, while others have not been successful.

11. Please indicate how familiar you were with electronic marketing before receiving this survey. (Frequency)

15	21	9	2	3
Not Familiar	Less Than Moderately Familiar	Moderately Familiar	Greater Than Moderately Familiar	Highly Familiar

12. Have you bought or sold commodities by an electronic marketing method? Yes 5 (10%) No 45 (90%) (Frequency)
    a. What method (see above statement)? _____
    b. What commodity (see above statement)? _____

13. Are you aware of other merchandisers who have bought or sold their commodities by an electronic marketing method? Yes 10 (20%) No 40 (80%) (Frequency)
    a. What method (see above statement)? _____
    b. What commodity (see above statement)? _____

14. What types of electronic information systems are you currently using, if any?
    _____

15. Please indicate the extent to which you feel each of the following potential pricing characteristics of an electronic market are important or not important to the merchandiser. (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Expanded information about quantities of grains offered at specified prices.....	8	7	13	12	9
b. Ability to bid on grain based on producers' asking prices.....	6	3	20	12	8
c. Expanded procurement area for grain.....	7	9	13	11	9
d. Expanded sales area.....	5	7	15	9	12
e. Ability to participate in periodic grain auctions.....	10	13	18	5	2
f. Ability to change bid or offer prices as frequently as you wish	4	4	8	15	18

16. For each of the following statements indicate how strongly you agree or disagree. (Frequency)

	Strongly Disagree	Disagree	No Opinion or Neutral	Agree	Strongly Agree
a. Grain is sold at an average price without the use of premiums or discounts	5	12	2	4	2
b. Lower quality grain is discounted but no premium is paid for higher quality grain	5	6	2	9	3
c. A premium is paid for high quality grain and all other grain is paid an average price	4	10	4	6	1
d. Both premiums and discounts are used in the sale of grain	0	5	3	9	8
e. I receive a reasonable margin on my grain sales	0	4	3	12	4

17. Causes of market inefficiency, if any, can be related to prices not reflecting the value of products or to high grain handling costs. Please indicate the relative importance of each of the factors listed below as factors causing markets to be inefficient. (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Lack of market information	3	1	8	5	7
b. Not enough competition among buyers	3	3	13	2	2
c. Lack of proper grading specifications, premiums and discounts at local elevators	3	4	8	6	2
d. Unanticipated variations in the price of grain	1	0	10	6	5
e. Lack of available transportation facilities	3	1	10	3	7

18. Which of the following are important objectives of your grain handling operation? (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Obtain the best price.....	0	0	1	4	20
b. Obtain grain storage income	3	0	4	8	10
c. Hedge grain sales.....	2	3	11	4	5
d. Cash forward contract grain sales.....	3	4	8	6	4
e. Maintain high turnover.....	3	3	6	6	6
f. Maximize annual profit.....	0	0	1	3	20

Electronic marketing of cash commodities involves using various forms of communication and data processing technology. Buyers and sellers trade cash commodities with the aid of conference telephones, video tape equipment, microcomputers, or computer terminals connected to large (main frame) computers. The objective of electronic markets is to create a centralized trading arena where all potential buyers and sellers can compete and finalize trades. Commodities are bought or sold based on description. Electronic markets have been tried for feeder pigs, slaughter hogs, feeder cattle, slaughter cattle, slaughter lambs, wholesale meat, eggs, cotton, and hay. Some electronic marketing systems are operated commercially, while others have not been successful.

19. Please indicate how familiar you were with electronic marketing before receiving this survey. (Frequency)

3	10	7	3	2
Not Familiar	Less Than Moderately Familiar	Moderately Familiar	Greater Than Moderately Familiar	Highly Familiar

20. Have you bought or sold commodities by an electronic marketing method? Yes 3 (23%) No 10 (77%) (Frequency)

a. What method (see above statement)? _____

b. What commodity (see above statement)? _____

(Over)

21. Are you aware of other merchandisers who have bought or sold their commodities by an electronic marketing method? Yes 3 (12%) No 21 (88%) (Frequency)

a. What method (see above statement)?_____

b. What commodity (see above statement)?_____

22. What types of electronic information systems are you currently using, if any?

_____

23. Please indicate the extent to which you feel each of the following potentital pricing characterstics of an electronic market are important or not important to the merchandiser. (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Expanded information about quantities of grains offered at specified prices	3	0	12	4	4
b. Ability to bid on grain based on producers' asking prices	6	3	6	5	3
c. Expanded procurement area for grain	2	3	12	4	2
d. Expanded sales area	3	1	11	3	5
e. Ability to participate in periodic grain auctions	7	5	9	2	0
f. Ability to change bid or offer prices as frequently as you wish	5	0	7	4	7

24. Please indicate the extent to which you feel each of the following potential information services of an electronic market are important or not important to the merchandiser. (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Improved access to details of current sales or purchases	2	4	7	6	4
b. Improved access to summaries of all sales and purchases	2	0	13	5	3
c. Improved access to forward contract offers from producers	3	1	8	9	2
d. Improved access to information about available storage facilities	4	4	10	3	1
e. Improved access to other market information:					
1. Currency exchange rates	7	8	2	4	1
2. News: general.....	3	3	8	6	2
commodity.....	2	2	4	9	5
3. Prices: local.....	1	1	6	6	9
national.....	2	2	8	6	4
world.....	2	4	7	4	5
futures.....	1	0	3	7	11
forecast.....	1	2	5	7	6
4. Trade leads.....	4	2	9	2	5
5. Transportation rates...	3	0	5	6	9
6. USDA reports.....	3	2	9	3	6
7. Weather: local.....	3	1	9	5	4
national.....	1	2	10	3	6
world.....	3	2	9	2	4
8. Other: _____					

25. Please indicate the extent to which you feel each of the following potential operational characterstics of an electronic market are important or not important to the merchandiser. Ability to: (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Buy grain described by an independent third party	3	3	11	3	4
b. Market grain knowing that seller performance is guaranteed	3	0	5	10	7
c. Send and receive electronic mail	5	8	7	4	1
d. Use the computers for other consumer services (airline reservations, catalog shipping, etc.)	8	7	8	2	0
e. Other: _____					

26. Please indicate the extent to which you feel each of the following transportation services of an electronic market are important or not important to the merchandiser. Ability to: (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Locate truck transportation	6	4	7	2	5
b. Locate rail transportation	7	2	8	2	5
c. Locate barge transportation	12	3	5	1	1
d. Negotiate freight rates	6	1	5	7	5

27. If an electronic market for buying or selling your grain was available, how would you rate the importance of each descriptive characteristic? (Frequency)

Merchandisers could buy or sell their grain based on the following descriptive characteristics:

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Location (FOB a specific point).....	3	1	3	6	11
b. Delivery conditions.....	1	1	5	7	10
c. Quantity.....	2	1	2	7	11
d. Moisture.....	1	1	8	6	7
e. U.S. Grade.....	1	1	7	6	9
f. Protein.....	2	3	8	4	7
g. Percent oil.....	6	6	6	1	3
h. Heat damage.....	1	3	8	4	6
i. Total damage.....	1	3	8	5	5
j. Broken kernels.....	1	3	7	4	6
k. Test weight.....	1	2	7	6	6
l. Foreign material.....	1	2	9	4	6
m. Defects.....	1	2	7	6	6
n. DHV.....	2	3	7	4	4
o. Other: _____					

(Over)

28. There are several potential grain buyers and sellers as well as other firms that could be involved in an electronic market for grain. Please indicate how much you feel each of the groups listed below may benefit from an electronic market for grain? (Frequency)

	No Benefit	Less Than Moderate Benefit	Moderate Benefit	Greater Than Moderate Benefit	Great Benefit
a. Sellers:					
1. Grain producers	2	7	9	3	4
2. Elevators	3	1	13	2	6
3. Broker	1	1	5	11	7
b. Buyers:					
1. Livestock feeders or other farmers	1	6	6	6	5
2. Local elevators	5	2	6	5	7
3. Subterminal elevators	1	4	5	8	7
4. Inland terminal	3	2	4	6	9
5. Grain exporters	2	2	4	4	11
6. Grain millers and processors	2	1	4	6	11
7. Feed mills	2	1	7	6	8
8. Port elevators	2	2	7	5	8
c. Other firms:					
1. Commodity brokers	1	2	5	5	11
2. Transportation firms (railroads, barge, or trucking firms)	2	2	12	5	4
3. Private market information suppliers	2	2	7	6	7

29. Listed below are several groups which might be involved in an electronic market. If an electronic market for grains was formed, who should: (Frequency)

	Producers or Producer Trade Assns.	Buyers or Buyer Trade Assns.	*Private Third Party Firms	Govern-ment	Other
a. Own and control the system	4	9	12	0	1
b. Guarantee delivery of grain	9	6	6	0	1
c. Guarantee payment	2	15	6	0	0
d. Describe and grade grain	6	4	8	3	1
e. Guarantee quality	12	5	5	0	0
f. Resolve disputes	1	8	9	0	2

*The Private Third Party Firms would be independent firms set up specifically to organize and control these functions.

30. a. Please indicate how strong you feel the need is for an electronic marketing system for grains? (Frequency)

6	8	8	2	0
No Need	Less Than Moderate Need	Moderate Need	Greater Than Moderate Need	Great Need

b. Give the principle reasons why or why not. _____

31. Indicate the degree to which you agree or disagree with each of the statements listed below. (Frequency)

	Strongly Disagree	Disagree	No Opinion or Neutral	Agree	Strongly Agree
a. Grain will be bought and sold through a computerized tradir system within five years	3	6	10	4	0
b. Transportation services will be bought and sold through a computerized trading system within five years	2	6	12	2	1
c. Local elevators would use a computerized trading system	4	8	6	4	1
d. Inland terminal or subterminal elevators would use a computerized trading system	3	3	5	11	1
e. Export elevators would use a computerized trading system	1	3	6	11	2
f. I would use a computerized trading system	4	6	10	2	1
g. Local elevators would use a computerized information system	1	2	9	6	2
h. Inland terminal or subterminal elevators would use a computerized information system	0	4	4	12	3
i. Export elevators would use a computerized information system	0	3	5	11	4
j. I would use a computerized information system	2	3	9	6	3

32. If in fact a system is developed on a cost-efficient basis, would you have one?
Yes 2 (9%) No 2 (9%) Maybe 19 (82%)
Approximately how much would you be willing to pay per month for the use of such a system?
$358 (AVG) (150-1000)*

*Range

APPENDIX E

GRAIN AND FEED ASSOCIATION OFFICERS AND DIRECTORS QUESTIONAIRE WITH SUMMARY STATISTICS

OKLAHOMA STATE UNIVERSITY
Agricultural Experiment Station
Department of Agricultural Economics
Stillwater, Oklahoma 74078

LOCAL GRAIN ELEVATOR SURVEY

1. a. Name of firm: _____
   b. Type of organization: Cooperative 6, Independent 17 (Frequency)
   c. Type of facility: Local 19, Inland Subterminal 1, Inland terminal 2, Export 1 (Frequency)

2. Please list the names and locations of branch elevators or stations:

Name	Locations

3. Person completing survey: Name _____
   Position _____
   Address _____
   _____
   Phone and area code: ( ) _____

4. What was your total grain storage capacity including branch elevators as of July 1, 1982? 4,009,708 (AVG) bu.

5. In 1982, what percentage of the grain delivered to your elevator was delivered during 1982 harvest? 72 % (AVG) (2-100)*

6. What is the radius of your grain procurement area? 50 miles (AVG) (10-300)*

7. How many other grain handling elevators are within your procurement area? 11 (AVG)(2-100)*

8. During 1982, approximately how many producers did you buy grain from? 473 (AVG)(20-3500)*

9. During 1982, approximately how many producers did you store grain for? 448 (AVG)(27-3000)*

10. a. During 1982, approximately how many bushels of grain did you handle? 4,659,280 (AVG)
    b. During 1982, approximately what percentage of your total grain volume handled was: (AVG)

Wheat	47 %
Corn	23 %
Soybeans	6 %
Other	24 %
Total	100 %

11. Approximately what percentage of the grain purchased from farmers by your elevator was handled in each of the following ways? In column 1, indicate how grain was purchased in 1982. In column 2, indicate how you would have preferred to have purchased grain in 1982. (Average)

	Actual	Preferred
a. Purchased for cash immediately at harvest time (no contract)	20 %	12 %
b. Stored and purchased at a later date	47 %	26 %
c. Contracted for a harvest cash sale	4 %	3 %
d. Purchased at harvest time with payment deferred	3 %	4 %
e. Purchased from farm storage after harvest	11 %	11 %
f. Other (please specify) _____	3 %	3 %

*Range

1. Approximately what percentage of your grain sales (bushels) in 1982 was sold in the following manner? In column 1, indicate how grain was sold in 1982. In column 2, indicate how you would have preferred to have sold the grain. (Average)

	Actual	Preferred
a. Sold to farmers as grain or processed feed	16 %	16 %
b. Sold for immediate shipment (up to 15 days)	31 %	19 %
c. Sold for 15-30 day shipment	24 %	10 %
d. Sold for shipment after 30 days	21 %	23 %
e. Delivered against a futures contract	3 %	1 %
f. Other (please specify) _____	1 %	0 %

13. In 1982, approximately what percentage of your grain sales (bushels) was delivered in the following ways? In column 1, indicate how grain was sold in 1982. In column 2, indicate how you would have preferred to have sold the grain. (Average)

	Actual	Preferred
a. Was delivered to meet a specified grade	38 %	20 %
b. Utilized a contract specifying a price and delivery date, but which allowed for premiums or discounts if you deliver grain before or after the specified delivery date	36 %	27 %
c. Utilized a multiple shipment contract in which several deliveries are provided for in the same contract over a specified time period	12 %	10 %
d. All other methods	7 %	3 %

14. In 1982, what percentage of your grain sales (bushels) went to each of the following types of buyers? In column 1, indicate how your grain was distributed. In column 2, indicate how you would have preferred to have distributed the grain. (Average)

	Actual	Preferred
a. Cash brokers	15 %	7 %
b. Coop inland terminals or subterminals	9 %	5 %
c. Independent inland terminals or subterminals	9 %	6 %
d. Port terminals	25 %	17 %
e. Farmers	9 %	8 %
f. Millers, crushers, processors	15 %	10 %
g. Other (please specify) _____	15 %	5 %

15. How important is each factor listed in determining who you sold grain to in 1982? Please check the appropriate blank. (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
1) Price bid.....	0	0	1	2	20
2) Contractual arrangements..	0	1	4	3	15
3) Advances or short term credit.....	6	3	5	4	5
4) Time and manner of payment	0	0	2	6	16
5) Premium and discount practices.....	0	0	7	6	11
6) Weighing accuracy.....	1	2	3	3	15
7) Penalties for delays in shipment.....	6	2	7	4	5
8) Premiums for large volumes	8	2	10	2	2
9) Frequent & consistent bidder	0	1	12	3	8
10) Market information provided by the buyer.....	5	1	9	4	4
11) Brokerage services.....	10	5	5	1	1
12) Management and personnel..	2	3	8	4	5
13) Terminal or processor facilities.....	3	5	9	3	2
14) Transportation services...	6	5	3	4	5
15) Size of dividends and investment opportunities..	13	3	5	2	0
16) Loyalty.....	6	2	6	3	7
17) Integrity of buyer.....	0	0	5	2	17

16. Please indicate the extent to which you feel each of the following potential information services of an electronic market are important or not important to the merchandiser. (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Improved access to details of current sales or purchases	2	6	17	12	12
b. Improved access to summaries of all sales and purchases	2	5	20	15	7
c. Improved access to forward contract offers from producers	2	5	19	16	6
d. Improved access to information about available storage facilities	4	11	20	11	3
e. Improved access to other market information:					
1. Currency exchange rates	14	10	16	4	2
2. News: general	3	11	21	10	0
commodity	2	4	18	15	9
3. Prices: local	1	4	17	15	12
national	1	8	18	15	7
world	1	11	21	11	5
futures	1	4	16	13	15
forecast	1	4	15	18	10
4. Trade leads	5	8	14	12	8
5. Transportation rates	3	4	17	15	10
6. USDA reports	4	4	18	9	14
7. Weather: local	4	7	21	11	6
national	4	10	16	12	6
world	6	10	18	10	4
8. Other: _____					
_____					

17. Please indicate the extent to which you feel each of the following potential operational characteristics of an electronic market are important or not important to the merchandiser. Ability to: (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Market grain knowing that seller performance is guaranteed	4	2	13	14	14
b. Send and receive electronic mail	9	12	15	9	3
c. Use the computers for other consumer services (airline reservations, catalog shipping, etc.)	20	11	13	4	0
d. Other: _____					
_____					

(over)

18. Please indicate the extent to which you feel each of the following transportation services of an electronic market are important or not important to the merchandiser. Ability to: (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Locate truck transportation....	10	7	13	10	8
b. Locate rail transportation.....	12	9	9	10	7
c. Locate barge transportation....	28	10	4	3	2
d. Negotiate freight rates.....	11	5	7	11	12

19. If an electronic market for buying or selling your grain was available, how would you rate the importance of each descriptive characteristic?

Merchandisers could buy or sell their grain based on the following descriptive characteristics: (Frequency)

	Not Important	Less Than Moderately Important	Moderately Important	Greater Than Moderately Important	Highly Important
a. Location (FOB a specific point)	1	4	14	12	17
b. Delivery conditions.....	1	4	14	12	17
c. Quantity.....	1	5	12	9	21
d. Moisture.....	3	5	14	11	15
e. U.S. Grade.....	3	4	15	9	17
f. Protein.....	4	8	13	9	14
g. Percent oil.....	17	8	13	5	4
h. Heat damage.....	6	9	12	13	8
i. Total damage.....	4	8	13	13	10
j. Broken kernels.....	4	8	15	11	10
k. Test weight.....	3	5	16	13	11
l. Foreign material.....	3	8	15	11	11
m. Defects.....	4	7	15	11	10
n. DHV.....	7	6	13	11	8
o. Other: _____					
_____					

20. There are several potential grain buyers and sellers as well as other firms that could be involved in an electronic market for grain. Please indicate the extent to which you feel each of the groups listed below may benefit from an electronic market for grain: (Frequency)

	No Benefit	Less Than Moderate Benefit	Moderate Benefit	Greater Than Moderate Benefit	Great Benefit
a. Sellers:					
1. Grain producers	4	12	20	4	8
2. Elevators	2	3	17	10	16
3. Broker	1	3	11	12	20
b. Buyers:					
1. Livestock feeders or other farmers	3	9	21	8	7
2. Local elevators	3	4	20	9	11
3. Subterminal elevators	2	4	11	15	14
4. Inland terminal	2	2	11	12	17
5. Grain exporters	2	2	8	9	24
6. Grain millers and processors	2	4	6	11	21
7. Feed mills	2	5	11	13	14
8. Port elevators	2	2	10	10	21
c. Other firms:					
1. Commodity brokers	3	3	11	8	20
2. Transportation firms (railroads, barge, or trucking firms)	6	7	14	7	12
3. Private market information suppliers	3	6	9	11	16

21. Listed below are several groups which might be involved in an electronic market. If an electronic market for grains was formed, who should: (Frequency)

	Producers or Producer Trade Assns.	Buyers or Buyer Trade Assns.	*Private Third Party Firms	Govern-ment	Other
a. Own and control the system	13	14	19	1	0
b. Guarantee delivery of grain	24	15	5	1	3
c. Guarantee payment	5	33	7	1	1
d. Describe and grade grain	7	12	18	12	0
e. Guarantee quality	25	11	6	1	4
f. Resolve disputes	5	12	27	5	0

*The Private Third Party Firms would be independent firms set up specifically to organize and control these functions.

(over)

22. a. Please indicate the extent to which you feel there is a need for an electronic marketing system for grains. (Frequency)

3	14	18	8	5
No Need	Less Than Moderate Need	Moderate Need	Greater Than Moderate Need	Great Need

b. Give the principle reasons why or why not. _____

_____

23. Indicate the degree to which you agree or disagree with each of the statements listed below. (Frequency)

	Strongly Disagree	Disagree	No Opinion or Neutral	Agree	Strongly Agree
a. Grain will be bought and sold through a computerized trading system within five years.....	1	19	15	10	1
b. Transportation services will be bought and sold through a computerized trading system within five years.....	3	20	14	11	0
c. Local elevators would use a computerized trading system....	3	15	12	17	1
d. Inland terminal or subterminal elevators would use a computerized trading system....	1	3	8	32	4
e. Export elevators would use a computerized trading system....	0	0	8	32	8
f. I would use a computerized trading system.....	4	10	16	16	1
g. Local elevators would use a computerized information system.....	2	3	7	32	4
h. Inland terminal or subterminal elevators would use a computerized information system	1	2	5	30	10
i. Export elevators would use a computerized information system	0	0	6	31	11
j. I would use a computerized information system.....	1	3	7	34	3

24. If in fact a system is developed on a cost-efficient basis, would you have one? (Frequency)
Yes 16 (33%) No 6 (12%) Maybe 27 (55%)
Approximately how much would you be willing to pay per month for the use of such a system? 219 (AVG) (0-500)*

*Range

VITA

Cynthia Jayne Bradley

Candidate for the Degree of

Master of Science

Thesis: ELECTRONIC MARKETING OF HARD RED WINTER WHEAT

Major Field: Agricultural Economics

Biographical:

Personal Data: Born in Durant, Oklahoma, April 9, 1961, the daughter of William J. and Janice M. Bradley.

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