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ELECTRONIC MARKETING IN PRINCIPLE AND PRACTICE

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Marketing of farm products,
Electronic
Electronic marketing has evolved in agricultural marketing thought over the past 20-25 years, with a distinct acceleration since the late 1970's. The first evidence of an electronic market, called "Sele-vision," for Florida citrus fruit was found in the mid 1940's (Cassidy). However, it was not until a teletype auction was developed for butcher hogs in Ontario during the early 1960's (Peer) that electronic marketing gained much interest.

After the development of a few successful telephone auctions (teleauctions) for livestock, principally pigs, and an unsuccessful teleauction for eggs in the U.S. during the 1960's, the concept was advanced when Schrader, Heifner and Larzelere proposed a computerized egg exchange in 1968 (Schrader et al.). Academic interest increased followed the publication of a conceptual assessment of electronic markets as part of the "Marketing Alternatives for Agriculture" series from the National Public Policy Education Committee in 1976 (Henderson et al., 1976). Attention became more focused in 1978 when USDA's Agricultural Marketing Service announced an initiative to partially finance pilot electronic marketing projects.

My purposes are to (1) define the concept of electronic marketing as it applies to agriculture, (2) describe applications of electronic marketing in agriculture, and (3) review some of the reasons for increased interest. These reasons, in turn, imply some performance expectations. The subsequent papers by Schrader and Sporleder bring

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empirical evidence to weigh on such expectations.

Electronic Marketing As A Concept

The term "electronic marketing" evokes many different perceptions. In fact, there may be no single description which includes all that different people view as electronic markets. Nonetheless, a concept can be formed by identifying their common elements.

The basic concept is simultaneous trade negotiations among spatially separated buyers and sellers, channeled into an interactive central market through electronic communications. Product movement occurs later. Neither traders nor products are physically assembled at a common location: products are sold by description rather than personal inspection by the buyer.

This basic concept covers several types of markets: (a) conventional and video teleauctions, where products are sold by an auctioneer to sellers interconnected through a conference telephone call, (b) teletype auctions, where a network of teletype printers is used to communicate product descriptions and conduct auction-type bidding among several potential buyers, (c) telephone clearinghouses, where a market agent collects and matches bids and offers from traders via telephone, and (d) computerized trading networks, where buyers and sellers interact through computer terminals connected to a central computer which manages the communications network and facilitates trading.

While the concept includes a wide range of market mechanisms, I believe that it is now appropriate to limit the definition to computerized trading networks. Further, I argue that it should include only computerized markets which utilize an open, competitive price establish-

ment procedure such as some variation of auction. This, as contrasted to computer-assisted trading systems which simply provide communications for private negotiations between an individual buyer and seller.

The restriction to computerized trading networks is pragmatic. Such networks can rapidly handle vast amounts of communications among large numbers of participants. This accommodates many traders in the market simultaneously, which is a critical ingredient to centralized trading and efficient pricing. It also facilitates the use of detailed product descriptions -- descriptions which might entail several hundred combinations of qualitative variables -- thus allowing great descriptive precision which reduces the chance of misrepresentation.

Further, the use of computer networks is spreading among firms that buy and and sell agricultural products. Applications are now being made for such things as inventory control, remote sensing of product condition and input needs, communications with customers and suppliers, and automated ordering of replacement inventories and invoicing for products delivered.

Many of these uses offer direct links to electronic marketing, such as remote sensing of product condition which aids in product description and customer/supplier communications which generate information on market supplies and demands. The indirect ties are equally important: people are becoming comfortable with computer communications for a growing array of management functions. Idle computer network capability is available at low marginal cost, thus encouraging the development of additional applications. And, the availability of idle time on computer networks overcomes the necessity of building such

capacity specifically for electronic marketing, thus reducing a major cost component.

My argument for the second restriction, to open price establishment procedures, is idealistic. One important reason for the interest in electronic markets has been the perception that they can enhance competition, improve pricing efficiency, and increase the accuracy with which prices reflect true market conditions (Henderson 1982; Sporleder 1980; Bell et al.). The belief that electronic marketing can improve pricing performance rests on the concept of such markets as readily accessible centralized exchanges. That is, broader buyer and seller participation in the market increases competitive interaction, resulting in trading that more extensively represents market forces. Further, centralized trading facilitates collection and dissemination of market information, thus reducing the potential for information partiality that distorts transaction prices (Henderson et al. 1983).

However, the use of a centralized exchange may not be the sole reason for improved pricing performance. The method used to establish price may be equally important. With one exception, all electronic markets for agricultural products have utilized some variation of auction-type pricing -- English or ascending bid, Dutch or descending bid, sealed bid auction, double or bid-offer-accept auction, or some combination thereof (for a more complete discussion of auction variations see Schrader and Henderson). Market design, therefore, shows a close link between electronic markets and competitive price establishment procedures.

Numerous experiments have been conducted using different pricing

procedures in laboratory settings (Plott; Issac and Plott; Smith; Plott and Smith; Forster and Henderson). The bulk of the evidence reported from these experiments demonstrates that a market's tendency to generate transaction prices which are close approximations to (known) competitive equilibrium prices is significantly greater when some form of auction or competitive pricing is used, as compared to private negotiation, regardless of the structure of the market. The implication is that open, competitive pricing procedures are probably at least as important to the performance expectations of electronic markets as is remote trader access to centralized trading.

To capitulate, there are several characteristics common to the concept of an electronic market:

1. Organized trading. These are organized markets within which there are established rules of trader behavior and rights for participants. Rules include guidelines on product description, delivery, payment and settlement of disputes. Rights include access to deals with other traders and to information available in and generated by the market, and the right to act on such information.

2. Centralized, competitive price negotiation procedures. These markets provide a single forum where large numbers of traders competitively interface through some type of auction-like procedure to strike deals with other participants. They are the antithesis of private, one-on-one trading in that there are alternative buyers and sellers in the market who can consummate a deal at only marginally different terms.

3. Remote access through electronic communications. Potential traders participate in these markets from scattered and distant loca-

tions (generally, their individual business locations). They assemble for market purposes through electronic communications, rather than in person at a central location.

4. Description selling. Products traded are not brought together at a common location for inspection by potential buyers. Rather, they are described in terms that are clear and meaningful to buyers and sellers alike. This may be a verbal description, pictorial description, or combination. In some cases third party inspectors are used to assure accuracy, objectivity and integrity. Over time, electronic sensing of product attributes is likely to play a larger role.

5. Post-sale product delivery. Products are sold by description between spatially separate traders. Thus, products are not delivered until sales negotiations have been completed. Then, shipment can be direct from seller to buyer. Further, the timing of delivery can be a negotiated or specified term of transaction.

None of these characteristics is unique to electronic markets. But, their combination in a single trading system is unique. This distinguishes electronic markets from other market institutions. Collectively, these characteristics also reveal what electronic markets are not. Specifically, they are not just computerized market information networks, although they do generate and disseminate information, because they are actual markets within which transactions are made. Nor are they spot markets, because product delivery occurs after sales negotiation. At least hypothetically, there is no limit to the delivery time frame that can be included in terms of trade.

Electronic Marketing in Practice

While there has been increased interest in and discussion of electronic marketing in recent years, only six operating, computerized trading systems have been developed for agricultural commodities in the U.S. (Table 1). Of these, five were financed in part with public funds. The Hog Accelerated Marketing System (HAMS) for slaughter hogs originating in Ohio and eastern Indiana and the Cattle Exchange (CATTLEX) for feeder and stocker cattle in Texas were developed predominantly with public funds. The National Electronic Marketing Association (NEMA) grew out of a joint public and privately-financed venture for marketing lambs, and has since used a combination of public and private funds to expand to hogs and feeder cattle. The Egg Clearinghouse (ECI), trading shell eggs nationally, and the American Meat Exchange's Computer Assisted Trading System (CATS) for trading meat, were developed primarily with private capital, supplemented with public funds for specific applications. Only TELCOT, which trades cotton originating in Texas and Oklahoma, was developed entirely with private funding.

The two oldest, TELCOT and ECI, were developed commercially. The others resulted from USDA's funding initiative for pilot projects. One of these, NEMA, has since evolved into a commercial operating system and is now a majority-owned subsidiary of National Livestock Producers Association. The other three, HAMS, CATTLEX, and CATS, operated only as pilot or experimental markets for limited periods.

Trading volumes have varied widely. The three commercial systems are all trading at significantly larger volumes than did the three now-terminated pilot projects. In actuality, the lack of sufficient

TABLE 1. ELECTRONIC AGRICULTURAL COMMODITY MARKETS IN THE U.S., 1975-1984

	TELCOT	ECI	NEMA	HAMS	CATTLEX	CATS
Commodities Traded	Cotton	Eggs	Lambs, Hogs, Feeder Cattle	Hogs	Feeder Cattle	Meat
Operating Organization	Plains Cotton Cooperative Assn., Lubbock, TX	Egg Clearing- house, Inc.; Durham, NH	National Electronic Marketing Assn., Christiansburg, VA	Ohio State University and Producers Livestock Livestock, Assn. Columbus, OH	Texas A&M University, College Station, TX	American Meat Exchange, Elmhurst, IL
R & D Support	--	--	Virginia Tech. University, Computer Sciences Corp.	Ohio State University	Texas A&M University	University of Illinois, General Electric Information Services Co.
Purpose	Commercial	Commercial	Pilot and Commercial	Pilot	Pilot	Pilot
Source of Capital	Private	Predominantly Private	Public and Private	Predominantly Public	Public	Predominantly Private
Operational Period	Since 1975	Since 1978 ^{1/}	Since 1980	Nov. 1980-June 1981	Sept. 1980- Nov. 1981	June-Nov. 1981
Communication System	Leased Wire	Inbound WATS	Utility Computer Network	Leased Wire, Dial-in	Leased Wire	Utility Computer Network
Number of Computer Terminals	405	56	45	47	29	16
Market Area Sellers:	Tex., Okla.	National	Mid South, Corn Belt, Great Plains	Ohio, Indiana	Texas	National
Buyers:	National	National	National	Eastern States	Texas	National
Type of Pricing System	Sealed Bid, Firm Offer	Double Auction	English Auction, Reversing Auction	English, Dutch Auction	English Auction	Private Negotiation ^{2/}
Approximate Sales Volume	1.5 mil Bales/Yr.	700,000 Cases/Yr.	750,000 Head/Yr.	180,000 Head	2,400 Head	95 Carloads

Source: Compiled from Sarhan; Schrader and Mueller; Baldwin; Sporleder 1983; Mueller; U.S. General Accounting Office; Schlei; and personal communiques.

^{1/}Operated from 1972 to 1978 as a manual telephone clearinghouse. ^{2/}Operated as a private negotiation system during pilot. However, an open bidding system was subsequently developed for use in future applications.

trading volumes was the singular reason for termination of those projects. Further, it is not yet clear that ECI and NEMA have achieved sufficient trading volumes to assure long term viability.

All six markets were designed to provide traders with direct access to a central computer through computer terminals located at the traders places of business. In some cases terminals were also put at locations convenient to farmers such as local cotton gins and livestock yards. Communications systems ranged from dedicated leased wires for TELCOT, HAMS and CATTLEX to WATS telephone service on ECI and time-sharing on utility computer networks for NEMA and CATS. ECI also has available operators who interface by telephone between the market computer network and traders. Thus, ECI traders can participate without direct access to a computer terminal. No single type of network has proven clearly superior, although the utility networks are generally the least costly to operate (Turner and Epperson). In all systems the computer manages communications among traders simultaneously, accepts and matches bids and offers, and compiles and disseminates market information.

Except for CATS, these systems have used some type of competitive bidding between buyers (one-sided auction: TELCOT, NEMA, HAMS, CATTLEX) or progressive bidding and regressive offering among buyers and sellers (double auction: ECI). TELCOT also has a "firm offer" option that allows sellers to list an offer at a specific price. CATS provided only a mechanism for private negotiation between an individual buyer and seller once a buyer (seller) identified a seller (buyer) on the system with whom he desired to negotiate. As such, CATS did not fully meet the criteria as an electronic market. Subsequent to its pilot operation,

however, a modification has been designed for use should it be revived commercially that changes pricing to open, competitive bids and offers.

A design limitation on each system was the necessity to use a specific type of computer terminal. This restricted compatibility with other uses of computer networks, raising costs and probably discouraging participation. As computer systems become more compatible and as the use of computer networks expands, this problem appears to be diminishing.

Regardless of the potential impact of advances in computer network technology on electronic marketing in the future, however, one is reminded that experience to date is limited. An important question seems to be, is the concept of electronic marketing a passing fancy, or does it rest on a solid foundation of economic logic?

The Relevance of Electronic Marketing to Agriculture

Agriculture has experienced substantial change over the past several decades. These include declines in the number of farms and people working on farms, increased specialization, a shift of many functions once performed on the farm to off-farm enterprises, and a change in the predominant way of marketing farm products from assembly markets to direct deals, contracts, and other types of private treaties.

Markets are an important means of economic organization in agriculture, whereby the outputs of one stage are coordinated with the input needs of an adjacent stage. At one time, central assembly markets such as terminal livestock and wholesale produce exchanges were dominant. These attracted large volumes of products and large numbers of traders. They came to be viewed as "the highest type of organization and the

highest development of efficiency in marketing farm products" (Clark and Weld, p. 292), and prices established therein were generally accepted as accurate guides to true market values (Duddy).

The heyday of central assembly markets was the half century centered on 1900. Since the end of WWII, their relative importance has eroded rapidly. For the most part they have been displaced by direct sales, private marketing agreements, various types of formula-priced contracts, and vertical integration. Part of this shift has been cost-driven, with the combination of truck transportation and larger farms facilitating efficient direct-to-processor shipments, thus avoiding the costs of product assembly. Some has been driven by the improved coordination and lower risk that increasingly interdependent firms can achieve by dealing directly with each other. As Shaffer pointed out in a seminal paper in 1968, "Many of the coordination institutions of the food and fiber sector have become obsolete or inadequate ... If improved coordination is not accomplished through market exchange institutions it will be done by vertical integration." (p. 13). In actuality, it's been done largely by shifting from centralized marketing to various types of private treaties.

It is largely in terms of pricing inaccuracies or inefficiencies where the most significant problems have been perceived regarding the shift away from centralized markets. Hayenga succinctly summarized this issue as viewed by many economists and market participants alike: "The great concerns seem to be associated with markets which once were broadly traded, but which changed when vertically integrated systems or longer term contracts, especially reference or formula price contracts,

became dominant. As the residual market decreased, insecurity increased regarding the representativeness of transacted and reported prices, the potential ease of price manipulation, the adequacy of market information, and the risk of having sufficient buyers or sellers available at any time to insure an equitable price." (p.1).

Much of the interest in electronic markets has stemmed from the belief that, by centralizing price establishment while decentralizing product flow, the pricing advantages characteristic of central assembly markets can be achieved without jeopardizing the cost and coordination advantages of direct product transfer. Indeed, it has been argued that electronic markets have the potential to improve on both the cost and coordination advantages of direct trading and on the pricing efficiency of product assembly markets (Purcell; Henderson 1980).

For example, the ability to identify, describe and communicate increasingly finite detail on product attributes and needs facilitates price discrimination based on meaningful characteristics, minimizes the need for and cost of personal product inspection prior to purchase, and reduces uncertainty of market transaction. Remote trader access through electronic communications increases the potential number of buyers and sellers in the market, thus reducing search costs. Organized, competitive sales negotiations among many traders increases the likelihood that marginal changes in terms of trade will result in completed transactions, at the same time that it lowers the cost and increases the accuracy of market information.

Thus, electronic marketing can be viewed as offering the potential to mitigate perceived pricing problems and improve coordination in

agriculture without imposing higher exchange costs on participants. Experience with electronic marketing provides an empirical base to assess its actual performance. However, the lack of resounding commercial success raises the question, is this performance an unrealistic expectation, or is this a concept whose time is yet to come? The following papers help provide the answer.

Footnotes

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