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Institutional Economics and the Emergence of E-Commerce in Agribusiness

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and Andrew Schmitz**

The emergence of E-commerce in the 1990s heralded the arrival of the New Economy. However, the failure of numerous dotcoms since early 2001 has led to a debate regarding the future direction of E-commerce and its potential relevance for agribusiness. This study examines the economic implications of E-commerce for agribusiness within the framework of New Institutional Economics. The New Institutional Economics implies that E-commerce has the potential to reduce direct transactions costs in agricultural markets, but that it also may add additional indirect transactions costs. Depending upon the tradeoff between these costs, an institutional innovation which reduces the transactions costs may provide the impetus for an alternative marketing channel for agricultural output. Two models of institutional change are explored. The North model of changes in the rules of the game is found to be more consistent with the advent of E-commerce than the model of technological change suggested by Schumpeter.

Key Words: E-commerce, marketing channels, New Institutional Economics, Schumpeter

During the 1990s, a business paradigm known as the New Economy emerged in the United States. This paradigm held that companies could use information technology (IT) to become more responsive to the needs of producers, processors, wholesalers, distributors, retailers, and consumers. IT provides for electronically gathering, generating, storing, analyzing, distributing, and using information.

E-commerce, made possible through IT, has enabled business to increase efficiencies associated with supply chain management (SCM). E-commerce encompasses any economic transaction performed through electronic communication and comprises electronic data interchange (EDI), internet, and extranet. EDI systems are networks which enable firms to send data between remote establishments or to link with other firms to conduct business transactions. While EDI networks are private, the internet is a public electronic network that can be used for transactions between firms as well as transactions between firms and consumers. The extranet uses the

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internet to transfer information which is encoded to maintain privacy and security (Chambers et al., 2001).

Beginning in late 2000, the stock market boom associated with new E-commerce ventures faded (Konrad, 2000). Entrepreneurs from E-commerce start-ups began to experience difficulties in attracting capital from the equity markets. The stock market, once infatuated with the potential for E-commerce, began to demand financial performance. As a result many E-commerce ventures failed, the majority of which were of the internet variety, as they burned through their initial capitalization.

The failure of numerous dotcoms since early 2001 has led to a debate regarding the future direction of E-commerce and its potential relevance for agribusiness. This study examines the economic implications of E-commerce for agribusiness. We discuss the major reasons for past failures and successes of E-commerce in agribusiness by drawing upon several relevant economic theories that provide insight into the future role of E-commerce in agribusiness.

One approach to valuing the costs and benefits of E-commerce is derived from the transactions cost economics associated with the New Institutional Economics (NIE) approach, originating with Coase's 1937 "The Nature of the Firm." Within this paradigm, E-commerce may allow farmers, processors, or consumers a mechanism to reduce certain direct and indirect transactions costs associated with buying or selling agricultural products. However, E-commerce can also introduce additional direct and indirect transactions costs into the marketing channel (such as security costs associated with external access to the company's computers). Depending upon the tradeoff between these costs, an institutional innovation that reduces net transactions costs could provide the impetus for alternative marketing channels in agribusiness.

Reductions in transactions costs alone are insufficient to bring about changes in marketing institutions. Agricultural marketing mechanisms have evolved over time according to their ability to match buyers and sellers at minimum cost, given the existing set of legal rules and regulations defined by government. The theory developed by North (1991) suggests institutional change tends to be discontinuous and path dependent. Under this theory, institutions are not likely to be optimum in a continuous sense. The current institutional arrangement is "optimal" if the discrete gain from moving to an alternative organization is less than the cost of adopting the new institution. This results in institutional structures which are stable for (possibly extensive) periods of time followed by significant changes. As an alternative, the framework developed by Schumpeter (1934, 1942) focuses on the role of innovation, in which previously dominant institutions are replaced by new firms that adopt technology in either production or SCM.

Markets, Market Channels, and Transactions Costs

Supply chain management encompasses several different sectors of the economy. While consumers are the terminal market for most agricultural goods, there are numerous steps in the supply chain that occur before a good is sold to the consumer. Manufacturers sell to wholesalers who market to retailers who market to consumers.

The supply chain for agricultural products consists of either monolithically integrated firms (vertical integration) or a series of independent firms which are involved in coordinating activities (vertical coordination). We refer to the series of firms involved in the production, distribution, and delivery of goods to the consumer as the marketing channel. These marketing channels involve the transfer of goods from one firm to another in addition to production activities within each firm.

Beginning with Coase (1937), economists have analyzed the structure of firms within a marketing channel. This research has focused on the existence of markets for intermediate products versus integration. The NIE approach¹ examines markets by comparing transactions costs (the cost of arriving at the value of an intermediate product) with diseconomies of scope (the additional cost from adding a production process outside the original range of products). It is this tradeoff between transactions costs and diseconomies of scope that is potentially altered by the emergence of E-commerce. For example, the emergence of the internet may imply a reduction in transactions costs, leading to relatively more market transactions for intermediate products.

The innovation of E-commerce may have different implications for different types of agribusiness. In certain cases, E-commerce may lead to an increase in vertical coordination because of decreased transactions costs. In other cases, E-commerce may lead to an increase in the degree of vertical integration, in which the firm becomes involved in either upstream or downstream markets. If the diseconomies of scope are higher than the reduction in transactions costs introduced through E-commerce, E-commerce will lead to a higher degree of vertical coordination. However, if the diseconomies of scope are lower than the reduction in transactions costs introduced through E-commerce, then E-commerce will lead to an increase in the degree of vertical integration.

For example, the U.S. Sugar Corporation is a totally vertically integrated firm, as it owns all segments of the marketing channel from production to the retailer (Schmitz and Moss, 2001). On the other hand, sugarcane producers in Louisiana are not vertically integrated as they do not own facilities for refining sugar. In either scenario, the advent of E-commerce could lead to the establishment of an alternative market channel, or the emergence of new intermediaries in existing market channels, which will challenge existing firms, institutions, and markets.

Theory of the Integrated Firm

One conceptualization of the effect of E-commerce on agriculture involves the effect of the E-commerce on transactions costs. As noted above, Coase's seminal work on the theory of the firm involved a discussion of the boundaries of the firm. Why do some firms integrate into sequential production activities while others market

¹ According to Coase (1998), the term "New Institutional Economics" was coined by Oliver Williamson. Williamson (1998, p. 75) states: "What distinguishes the NIE from earlier (and some contemporary) work on institutions is that institutions are susceptible to analysis."

intermediate outputs? To put an agricultural spin on the question: Why do farmers sell wheat and not flour? Coase argued that the production activity would be integrated if the transactions costs exceed the diseconomies of scope. Returning to the agricultural example, if the transactions costs associated with marketing wheat are smaller than the diseconomies of scope associated with managing a flourmill, the farmer will sell wheat instead of processing wheat into flour. Examination of integration hinges on the definition of transactions costs.

Transactions costs within a market can include both direct transactions costs (such as the commission charged by livestock auctions) and indirect transactions costs [such as those costs enumerated by Williamson (1975, 1979, 1985)]. Williamson develops three characteristics of transactions costs: (a) asset specificity, (b) uncertainty, and (c) frequency of transaction. These three characteristics determine the structure of the market in terms of vertical integration.

Asset specificity refers to the connection between the production of the commodity and the specific needs of the buyer. The more specific the characteristics of production are to the needs of a specific buyer, the greater the specificity. Grossman and Hart (1986) use the example of a maker of automotive body panels and the car manufacturer. In this example, body panels are extremely specific to a particular model of automobile. Thus, the investment in a mold for making body panels leads to asset specificity.

At first glance, the commodity nature of products could be viewed as assets which are not specific. However, the degree of specificity may be greater than it appears—i.e., the scale of production may limit the farmer's potential market. A farmer with 20 acres of wheat averaging 35 bushels per acre grows only a total of 42,000 pounds of wheat. This quantity is somewhat less than a truckload, limiting the producer's opportunities for marketing wheat to the local elevator. Similarly, a producer with a 40-cow herd cannot offer the truckload lots required in video or internet auctions (Schmitz, Schmitz, and Moss, 2002), and thus is forced to rely on a local livestock auction. In each case, a farmer who is limited to local markets will face a certain degree of asset specificity. Larger farmers, however, may be able to use the internet to expand the geographic market area, reducing the degree of asset specificity.

The uncertainty characteristics associated with transactions costs imply the value of the intermediate product is difficult to determine. This difficulty may arise from several factors. In the Grossman and Hart (1986) example, the value of each body panel is determined by the demand for the final product. If sales are weak, the body panel is less valuable. Thus, the automobile manufacturer has an incentive to under-report the demand for the body panels based on final sales. In this framework, uncertainty can be depicted as a form of asymmetric information. However, the uncertainty may also arise from the difficulty associated with measuring the quality of the product. In the cattle markets, it may be difficult to ascertain the difference between a quality discount and market power. Similarly, the uncertainty may result from difficulty in valuing intermediate products, as discussed by Barzell (1982).

The frequency of transactions affects the relative quantity of information in the market. As products are bought and sold often, information regarding the ultimate

consumer value of products is revealed. For example, cattle are sold through local auction markets typically once per week. Thus, the quantity of new information revealed at the start of each auction pertains to changes in supply and demand in the week between sales. However, if the producer can observe the results of additional auctions between weekly auctions, the uncertainty regarding recent trends is reduced.

Following the Williamson framework, indirect transactions costs are high if the product is specific to an individual buyer or group of buyers, if the value of the product is uncertain due to either asymmetric information or quality uncertainty, and the transactions are infrequent. Williamson characterizes such transactions as “impacted competition” where the buyer can extract economic rents. The existence of these rents can provide the impetus for the introduction of E-commerce which can lead to either increased vertical coordination or vertical integration. In a specific case, Schmitz, Schmitz, and Moss (2002) found that the introduction of internet auctions allowed cattle producers to expand the scope of marketing alternatives and decreased the transactions costs of doing business by eliminating certain middlemen, essentially increasing the degree of vertical coordination.

Changes in the Marketing Channel

The impact of transactions costs discussed above focuses on innovations which may occur within an existing marketing channel. Specifically, E-commerce could result in lower transactions costs, implying higher prices received by the seller. Alternatively, E-commerce could reduce the diseconomies of scope leading to vertical integration within an existing channel or it could lead to more dramatic changes such as direct marketing channels for agricultural output.

Based on these potential differences in market impacts, we develop two economic models of transactions costs following the New Institutional Economics approach, to describe the potential changes in the market channel due to E-commerce. The transactions cost approach originated with Coase’s attempt to explain differences in vertical integration across businesses and industries. The economic model focuses on the marginal cost of market services. This approach follows along the lines of the market channel analysis performed by Moss and Schmitz (2002). Specifically, we analyze the potential impact of changes in the cost of marketing services. In this approach, E-commerce may represent an outward shift in the supply of direct market services at the farm level.

By their very nature, marketing channels are established at a cost and have evolved as the most cost-effective way of providing services within the legal and constitutional framework of a country. The market structure that exists at any point in time is a function of some established technology (phones, faxes, bank drafts, etc.). E-commerce represents an innovation in existing technology, which has the potential to increase SCM efficiency.

The implication of a reduction in the cost of marketing activities in the supply chain through E-commerce is presented in figure 1. The market facing middlemen is depicted in panel (a) of figure 1, while the market facing farmers who wish to

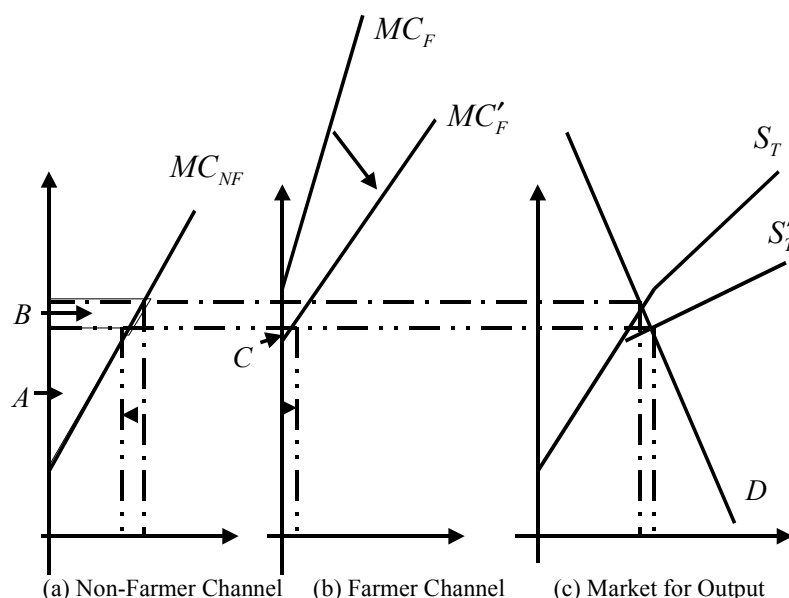


Figure 1. E-commerce as a change in technology

participate in direct marketing is shown in panel (b). Panel (c) represents the aggregate of the two marketing activities. MC_F is the marginal cost curve associated with direct farmer marketing before the innovation of E-commerce, and MC_{NF} is the marginal cost curve facing dedicated middlemen. S_T represents the aggregate industry supply curve at the retail level, which is derived through the horizontal addition of MC_{NF} and MC_F . The retail demand for the product is equal to D in figure 1(c). Note, in figure 1, the initial equilibrium price is lower than the intercept of MC_F , so that there is no incentive for direct marketing.

The introduction of a more efficient SCM system due to E-commerce would cause the marginal cost of direct farmer marketing to fall to MC'_F and the aggregate supply curve to shift outward to S'_T . If this cost reduction is large enough (as it is in figure 1), then the introduction of E-commerce in the marketing channel would result in some level of farmer direct marketing, and a reduced level of activity by dedicated middlemen. This shift would result in a reduction of profits to non-direct marketing of B and an increase in profits to direct farmer marketing of C . Moreover, consumers would be better off with E-commerce because the equilibrium price would drop, while sales volume would increase.

The analysis in figure 1 shows the case in which the decrease in the marginal cost associated with the introduction of E-commerce is sufficient to result in some type of direct marketing activity. It is an empirical question as to whether the reduction in marginal marketing costs associated with the introduction of E-commerce in a particular agribusiness industry is significant enough to warrant adoption of E-commerce technologies.

Any reduction in these marginal transactions costs must be weighed against the significant fixed costs and expected revenue stream associated with overhauling the supply chain and moving to an E-commerce based system. In many cases, the risks involved and the significant costs associated with paying for the initial investment in E-commerce may be too high compared to the expected benefits. Under these circumstances, adoption will not occur until either these costs are significantly reduced, or the efficiency gains associated with E-commerce are improved.

Institutional Change and the Marketing Channel

The foregoing analysis is based on the premise that the introduction of E-commerce will reduce net transactions costs for agricultural products. Even though there may be a net reduction in transactions costs brought about through E-commerce, this may or may not change the structure of the agribusiness marketing channel. To address this issue, we must consider economic theories related to institutional change. We draw upon two approaches—one developed by North (1990),² and the other developed by Schumpeter (1934, 1942).

Institutional Change

North begins by comparing the institutional approach to economic interactions with the game theoretic model. Starting with the latter, game theory suggests market conduct can be explained by a repeated game formulation. The repeated game breaks the prisoner's dilemma problem since the decision maker weighs the gains from defecting (cheating in the market) against the loss of future business. The institutional approach, on the other hand, ties market conduct to societal norms (morals, conventions, laws, etc.). In this framework, economic agents do not defect due to the cost associated with breaking a social norm. These costs may carry the formal weight of law (such as criminal prosecution under the Securities and Exchange Commission rules) or informal mechanisms such as shunning. The dominant theme from North's comparison is that the institutional framework allows for changes over time while the game theoretic approach involves economic interactions which are constant over time.

Building on the dynamic nature of institutions, North suggests certain properties of institutional change. Specifically, institutional change tends to be discontinuous and path dependent. Under this theory, institutions are not likely to be optimum in a continuous sense. Institutions cannot be characterized as continuous, but are viewed as discrete. Thus, standard neoclassical concepts of optimality need to be modified.

²The relationship between the institutional approach proposed by North and the NIE literature is somewhat ambiguous. As described in this section, North focuses on a definition of institutions based on the set of rules, laws, or conventions governing economic interactions. Williamson (1996) includes North's analysis of the rules of the game within the NIE approach. However, North (1991) expands the notion of transactions cost beyond Williamson's formulation to introduce factors such as social networks, agency theory, and enforcement problems.

The current institutional arrangement is “optimal” if the discrete gain from moving to an alternative organization is less than the cost of adopting the new institution. This results in institutional structures that are stable for (possibly extensive) periods of time followed by significant changes.

The second conjecture regarding institutions, following directly from the discontinuity of change approach, is that economic institutions are path dependent. One justification for the discontinuous change hypothesis is the transactions cost of changing institutions:

If institutions existed in the zero transaction cost framework, then history would not matter; a change in relative prices or preferences would induce an immediate restructuring of institutions to adjust efficiently.... But if the process by which we arrive at today's institutions is relevant and constrains future choices, then not only does history matter, but persistent poor performance and long-run divergent patterns of development stem from a common source (North, 1990, p. 93).

Thus, the transactions cost limits the potential for new institutions to emerge given the set of institutions that exist. More specifically, given positive transactions costs, it may not be possible to obtain an optimal set of institutions.

Under this framework, what can be said about the potential impact of E-commerce on agricultural marketing channels? First, this theory suggests that even if there are gains to the adoption of direct marketing channels through E-commerce, these gains may be insufficient to cover the transactions costs associated with changing the marketing institutions. Specifically, if we conceptualize the transactions cost as the cost of changing the consumer's customs for shopping at a grocery store to purchasing agricultural products through E-commerce, the cost of modifying consumer customs may exceed the benefits of direct marketing.

Second, the adoption of E-commerce is affected by path dependence. For example, grain elevators in the Great Plains evolved along railroad lines in the West as a means of loading grain into hopper cars for shipment. This technology gave rise to the elevator as a marketing institution. However, since the 1960s, several rail lines have abandoned miles of track, leaving elevators without service. These elevators provide an easily observed illustration of path dependency. The elevators remain in place even though the shift to more advantageous locations would reduce transportation costs. For example, elevators may move closer to interstate highways. However, since each elevator is associated with a significant investment, the elevator location remains fixed. Thus, towns no longer provided with rail service still have elevators due to path dependence. Further, from an institutional perspective, the role of grain elevators remains unchanged. They have simply adopted alternative technologies, but the institutions themselves remain.

The path dependency problem may be particularly important for certain types of E-commerce. For example, many of the dominant firms in internet cattle auctions have historically been involved in traditional livestock auctions (Producer's Video, Superior Livestock Auction, and Winter's Livestock Auction). In each case, these firms started with an established clientele and significant experience with the

regulatory environment (i.e., they were previously bonded under GIPSA). In the words of a representative for Producer's Video, "We are not a technology firm looking for an application, but a livestock marketing firm looking for a better way to market cattle."

Schumpeterian Competition

Joseph A. Schumpeter departed from much of the developing equilibrium analysis of the early twentieth century, focusing instead on notions of disequilibria. Following his discussion in *The Theory of Economic Development*, Schumpeter (1934) viewed the economy as a continuum of static equilibria (periods of circular flow) punctuated by intermittent periods of disequilibria (or periods of innovation). Schumpeter's early work attempted to trace these periods of innovation or disequilibria to economic factors instead of technology:

... there must be a purely economic theory of economic change which does not merely rely on external factors propelling the economic system from one equilibrium to another (quoted in Clemence, 1951, p. 158).

In later work, however, Schumpeter (1942) noted that technology itself could be endogenous. Schumpeter's model of technical change can be described as a system of creative destruction. In this model, capitalistic institutions (firms) compete intertemporally. The monopolistic power of a firm is limited by competition with firms having the potential to enter production using a new technology.

This framework is known as Schumpeterian competition, or Schumpeterian innovations. Each technological epoch can be thought of as a tournament. The winner of the last tournament obtains monopolistic power until the next tournament, in which the previous winner is replaced. Within this tournament context, the higher the level of monopolistic rent that exists, the greater are the potential profits to be made by challenging the current winner. Thus, extracting excessive monopolistic rents encourages competition from an innovator and reduces the time the previous winner can extract such rents.

In his original work, Schumpeter modeled the innovation as return to entrepreneurial effort. Specifically, he hypothesized that at any given time, several potentially profitable technologies exist in the economy. The role of the entrepreneur is to discover which of these technologies can be used to extract rents. Once a technology is identified, the entrepreneur creates a firm which competes with existing technology. If this innovation yields additional economic rents, then the new firm will replace the old firm over time and become the dominant technology.

Several modifications to the original Schumpeterian story should be noted. First, while his original work hypothesized that the sufficient technology for each innovation was preexistent, later works hypothesized that technology itself may be determined by the entrepreneurial process (and, hence, endogenous). Second, it is possible for a technological innovation to fail.

Applications of E-Commerce to Agribusiness

Two broad types of E-commerce emerged in the 1990s. These are known by the acronyms B2B (or business-to-business marketing) and B2C (or business-to-consumer marketing). Agriculture in the United States has experimented with both variants of E-commerce. For example, several firms have created B2B markets for cattle over the internet (see table 1). In addition, several producers or producer groups have established B2C marketing efforts, particularly in the area of packaged fruit (see table 2).

Each type of transaction (B2B or B2C) has slightly different implications for the structure of the marketing channel. The emergence of E-commerce between business entities may lead to decentralization of production if these innovations reduce transactions costs relative to diseconomies of scope. On the other hand, the creation of E-commerce directly between business and consumers may create new market channels which challenge historical marketing arrangements.

Drawing on the experiences of other sectors, many of these initial innovations followed the B2C approach of “category killers” which attempted to efficiently market a specialized product group (e.g., books or pet supplies) directly to consumers. The argument was that such specialization would lead to economies of scale and that expansion of the potential market through E-commerce would make it possible to survive without expanding the scope of the firm.

What does Schumpeterian competition imply for E-commerce in agribusiness? In a general sense, the major potential for E-commerce appears to be in the form of Schumpeterian innovation. A new technology should emerge to challenge several existing marketing channels.³ In each case, entrepreneurs will adopt new technologies in an effort to extract economic rents. Most of these rents (especially in the B2C area of E-commerce) were based on expanded market share and reduced costs. However, many of these innovators were not able to extract economic rents and have since gone out of business.

As firms scramble with an implementation strategy for B2B E-commerce activities, the pervasive issue becomes one of inventory management and order fulfillment. B2B within the context of agribusiness should follow similar pathways of other E-commerce implementations. As noted by Lohse and Spiller (1998), and Bellman, Lohse, and Johnson (1999), the typical internet consumer is increasingly resembling the general consumer. Post et al. (2002), however, report consumers as a group are not yet precise when it comes to identifying website features they prefer. In their recent study of B2B website attributes, Acharya and Kagan (2002) conclude B2B users are beginning to have the same set of interface-driven expectations as those held by B2C users.

³ In the case of the internet, the technology was originally exogenous to the business sector (most trace the initial development of the internet to DARPA net, which grew out of research for the U.S. Department of Defense). However, a portion of the internet innovation can be described as endogenous since such advances as secure online purchasing were largely the product of entrepreneurs.

Table 1. E-Commerce Websites for Cattle

Business Name	Website
Cuero Livestock Commission	www.cuerols.com
CyberStockyard	www.cyberstockyard.com
Turner County Stockyard, Inc.	www.turnercountystockyard.com
Winter Livestock Cattle Auctions	www.winterlivestock.com
CattleinfoNet	www.cattleinfo.net
Online Livestock Auctions	www.onlinelivestockauctions.com
Stockyards Online, Inc.	www.stockyardsonline.com
Digital Cattle	www.digitalcattle.com
Intermountain West Livestock	www.cattleforsale.com
Kinsey Auction Company	www.kinseyauction.com
Okeechobee Livestock Market	www.floridacattle.com
Producers Video Auction	www.producersvideoauction.com
Western Video Market	www.wvmcattle.com
Billings Livestock Commission Co.	www.billingslivestock.com
Producers Livestock Marketing	www.producerslivestock.com

Source: Compiled by authors based on multiple internet website searches.

Table 2. Direct Marketing Websites for Florida Citrus

Business Name	Website
AllCitrus.com	www.florida-fruit.com
AW/Crisafulli Groves	www.awcrisafulligroves.com
New River Groves	www.florida-oranges.com
Citrus Country Groves	www.citruscountry.com
Citrus.com	www.citrus.com
Conoley Citrus Packers, Inc.	www.conoleycitrus.com
Florida Citrus Ranch	www.citrusranch.com
Florida Citrus Stand	www.flcitrusstand.com
Indian River Gift Fruit	www.giftfruit.com
Orange Blossom Indian River Citrus	www.orange-blossom.com
Palm Beach Grove & Marketplace	www.pbgroves.com

Source: Compiled by authors based on search through www.yahoo.com.

In order to facilitate the adoption of a Schumpeterian innovation in B2B E-commerce associated with agribusiness, there must exist a long-term business commitment. This is particularly true for web-based businesses because most of these firms are at their early stages of development, making them vulnerable to short-term economic fluctuations. The pervasive issues of channel function repositioning must also be addressed at the organizational level. Downstream channel activities must

be created that are consistent with B2B in terms of inventory management and order fulfillment so as to establish a sustainable durable vendor/supplier relationship. In order for a practical B2B adoption to be successful for agribusiness, cost containment functions, channel activities, and SCM practices must become automated.

Three specific applications of E-commerce in agribusiness have proven successful: specialty citrus in Florida, internet auctions for cattle, and organic foods in California. These applications are significantly different, because most E-commerce related activity in Florida citrus represents a B2C innovation, whereas the livestock internet auctions represent a B2B innovation. E-commerce applications for organic foods in California contain elements of both B2B and B2C innovations.

In the case of Florida citrus, the introduction of E-commerce allowed growers to market specialty products directly to consumers. In contrast, internet auctions are used by producers to sell cattle to feedlots and not to sell meat directly to packers. Finally, California organic produce is sold as specialty products to consumers (B2C) as well as to upscale restaurants in the San Francisco Bay Area (B2B).

Florida Citrus

Historically, Florida's citrus industry has been dominated by the production of oranges for processing into frozen concentrated orange juice (FCOJ) and by the sale of fresh grapefruit through packers. The structure of the processing sector came under pressure throughout the 1970s and 1980s as Florida's orange production experienced multiple freezes and increased competition from Brazil. As a result of the Brazilian pressure, the industry has attempted several innovations, including not-from-concentrate orange juice and specialty fruit. With respect to nonspecialty fruit, E-commerce emerged as a possible marketing improvement. However, the introduction of efruitsinternational.com into the nonspecialty market proved unsuccessful, and it eventually failed.

Apart from the major packing-houses that handle grapefruit, a second group of packers in Florida has focused primarily on the gift fruit market. Specialty fruit represents the primary B2C operations in the Florida citrus industry. These operations either purchase fruit from local sources or grow specialty fruit. They box and ship smaller quantities of grapefruit, oranges (typically navel oranges), and specialty fruit within the United States and Canada (one packer even reported European sales). Based on telephone interviews, E-commerce in citrus is dominated by packers who purchase fruit from local sources, with little fruit actually produced in packer-owned groves (of the six packers we interviewed,⁴ only two operate citrus groves).

E-commerce has the potential to alter the marketing channel for specialty Florida citrus such as Honey Tangerines (Murcotts), Honeybells, and Sunburst Tangerines. Packers marketing gift citrus over the internet have sold fruit through catalogue

⁴ As a part of this research effort, we contacted AW/Crisafulli Groves, New River Groves, Citrus Country Groves, Conoley Citrus Packers, Florida Citrus Ranch, and Orange Blossom Indian River Citrus based on a www.yahoo.com search for citrus sales.

operations, although a few use alternative channels such as brokers to move fruit. Thus, the internet represents an alternative to a paper catalogue.

Most of these packers have been marketing with E-commerce for only a short time (less than two years). Further, while one packer reports 50% of his sales involve E-commerce, the others report less than 25% of sales through E-commerce. The greatest benefit appears to be visibility. Specifically, most of these packers rely on catalogue sales with little direct consumer advertising. They used Florida tourism and word of mouth to develop a customer base. A direct advantage of E-commerce for specialty fruits in Florida has been cheap visibility through internet advertising. (Refer to the list of E-commerce sites specializing in the sale of fresh citrus products directly to consumers, presented in table 2.)

Specialty fruit producers have innovated by using E-commerce to directly market specialty fruit to consumers, by-passing brokers. This innovation has reduced the cost of specialty fruit to consumers. In this instance, E-commerce made it possible for steps within a marketing channel to be replaced. This type of innovation follows the framework envisioned by North, since E-commerce was an innovation used by existing firms in order to reduce transactions costs in the marketing channel.

Why has E-commerce not been successfully introduced on a large scale for non-specialty citrus markets in Florida or, for that matter, the rest of the United States? A series of events would have to occur in order for direct marketing to take place in fruits on a large scale. For E-commerce operations to supplant channel operations and reduce the transaction mechanism, a produce grower would need to invest in a web presence of some sort, facilities necessary to disaggregate and package fruit for individual consumer sales, storage capabilities that may be different from existing storage, and supply chain inventory management systems necessary to support a dual-level marketing effort. The producer would be forced to absorb the cost of channel functions that would need to be capitalized within the structure of the E-commerce investment. Only then will the use of E-commerce practices readily support this type of activity, as long as customer identification and operating margins have been sustained.

Internet Livestock Auctions

The use of internet auctions for cattle is a B2B application, as opposed to a B2C application. As such, it does not represent direct access to the consumer. However, it is possible that internet auctions may replace at least one level within the traditional market channel for cattle. Further, internet auctions for livestock are not the only new technology for the marketing of cattle to emerge since the 1980s. Specifically, internet auctions for cattle must compete with video auctions which have been growing in popularity since the 1980s. Consequently, it is possible a tournament is occurring in the cattle market—but the winner may not be E-commerce.

Schmitz, Schmitz, and Moss (2002) provide a detailed discussion of cattle marketing institutions. For our purposes, we focus on the market channel for stocker cattle (cattle weighing between 500 and 700 pounds that are used as inputs for feedlots).

These cattle are currently marketed through a variety of marketing mechanisms. Some stockers are sold through local livestock auctions to buyers who aggregate cattle into larger lots demanded by feedlots. Larger operators may ship large pens of cattle to regional livestock auctions for sale directly to feedlots. In a similar strategy, some producers are using video and internet auctions to market cattle directly to feedlots. And finally, some producers market stocker cattle directly to feedlots through private sales.

Intuitively, the smaller the pen of stockers marketed, the lower the price received. Traders and order buyers who purchase smaller pens of cattle at local livestock auctions extract rents for aggregating cattle into larger pens. In addition, the commission and transportation are typically more expensive for local livestock auctions. Further, local livestock auctions are more prone to asset specificity, and hence may suffer from impacted information (as described by Williamson). The use of video and internet auctions yields higher prices for larger producers.

As noted by Williams and Stout (1964), most stocker cattle in the United States were marketed through private sales and terminal markets in the early twentieth century. However, by the 1950s, local livestock auctions dominated the sale of stocker cattle. Since that time, the prevalence of local livestock auctions has declined. Table 3 presents survey results on the current use of marketing mechanisms by state for the 15 largest cattle-producing states in the United States. These results indicate a movement toward video and internet auctions, along with private sales, since the 1964 work of Williams and Stout.

Further, we note the difference between uses of marketing mechanisms based on herd size. Schmitz, Moss, and Schmitz (2002) found that states with larger average herd sizes are less likely to use local livestock auctions and more likely to embrace video or internet auctions. The use of internet livestock auctions is an example of an innovation as discussed by North. It represents another example of an existing firm expanding its marketing options through E-commerce, thereby leading to a reduction in direct and indirect transactions costs.

The ultimate success of either E-commerce or video auctions in the feeder cattle market will not completely replace local auctions, although the number of local auctions will probably decline. As long as small producers need a market for stockers, some demand will exist for the services of local livestock auctions. However, E-commerce and video auctions may compete more directly with large regional markets currently dominating the market for stocker cattle. Moreover, the reduction in volume through these markets could reduce the public information which forms the basis of price discovery for local markets. This example could be likened to the reduction in the importance of live poultry markets caused by the increased use of broiler production contracts.

California Organic Foods

The production of organic foods began as a grass-roots movement in the early 1970s. The motivation was originally more philosophical than practical. Most foods initially

Table 3. Average Share of Marketing Mechanism by State and Nationally, 2002

State/Description	Marketed through Local Auctions	Marketed through Video Auctions	Marketed through E- Commerce	Marketed through Private Contract	Herds Greater than 500	Herds Greater than 1,000
Texas	0.610	0.165	0.090	0.135	0.470	0.360
Missouri	0.725	0.040	0.040	0.195	0.120	0.050
Oklahoma	0.600	0.090	0.035	0.275	0.350	0.230
Nebraska	0.600	0.050	0.045	0.305	0.640	0.500
South Dakota	0.725	0.050	0.025	0.200	0.415	0.205
Montana	0.125	0.150	0.050	0.675	0.510	0.250
Kansas	0.550	0.150	0.100	0.200	0.580	0.470
Kentucky	0.880	0.015	0.030	0.075	0.090	0.038
Tennessee	0.775	0.115	0.000	0.110	0.070	0.019
North Dakota	0.725	0.088	0.038	0.150	0.244	0.074
Iowa	0.720	0.020	0.015	0.245	0.270	0.140
Florida	0.553	0.198	0.073	0.177	0.562	0.430
Arkansas	0.825	0.040	0.010	0.125	0.140	0.065
Colorado	0.475	0.245	0.030	0.250	0.685	0.540
Wyoming	0.300	0.300	0.050	0.350	0.620	0.360
Weighted by Number of Beef Operations:						
Average	0.658	0.105	0.050	0.187	0.342	0.233
(Std. Deviation)	(25.769)	(12.319)	(6.160)	(18.987)	(36.537)	(31.474)
Weighted by Calves Marketed:						
Average	0.608	0.114	0.051	0.227	0.400	0.267
(Std. Deviation)	(6.907)	(2.834)	(1.162)	(5.553)	(7.360)	(6.397)

Source: Schmitz, Moss, and Schmitz (2002).

raised organic were grown in order to help save the environment. Since that time, the organic food industry has burgeoned to become a multi-billion dollar business. For example, organic foods generated \$11 billion in revenue for U.S. producers in 2001.

In a 1999 survey conducted by Hartman Group of Bellevue, Washington, only 25% of those surveyed believed the environment was a top motivator for buying organic. However, 38% cited flavor as an important reason to pay a premium of 15% or more for organic, and 66% of those surveyed purchased organic foods because they perceive them as healthier. Organic fruit, vegetable, and wine and beer sales in the U.S. increased by between 23% and 30% from 1998 to 2000, while organic dairy and wheat sales in the U.S. increased by nearly 100% over that same period (Crowley, 2001).

North-Central California has become the leader in organic food production. A list of the larger organic operations with a strong internet presence is provided in table 4. Earthbound Farm in the Salinas Valley has become the largest organic produce distributor in the nation. Earthbound specializes in pre-made and packaged mixed organic salads, but also sells organic vegetables, fruits, and seasonal vegetables. These are distributed nationwide in substantial quantities, primarily to upscale retail grocery stores.

Table 4. Direct Marketing Websites for Organic Food Production

Business Name	Website	Commodities
VB Farms	www.sunshineorganic.com	fruits, vegetables, preserves, plants
Dave's Organic Produce	www.davesorganics.com	vegetables
Earthbound Farm	www.ebfarm.com	vegetables
Organic Valley Products	www.organicvalley.com	dairy
The Organic Produce Shoppe	www.organicproduceshoppe.com	vegetables
Urban Organic	www.urbanorganic.com	fruits, vegetables
America Fresh	www.americafresh.org	fruits, vegetables

Source: Compiled by authors based on search on various internet search engines.

Producers such as the Organic Produce Shoppe and Urban Organic have taken a different approach to niche marketing. Individual consumers can log on to their website and can purchase a box of organic produce, to be delivered on a weekly or monthly basis. The selection of the products in the box varies seasonally, and the consumer does not have control over which specific items are delivered.

Yet another approach is taken by California producers such as VB Farms in Watsonville, and Dave's Organic Produce in Barstow. These producers allow the consumer to place a specific order for specific products and quantities directly on the web, which are then delivered to individual consumers via FedEx or UPS.

Perhaps the most ambitious organic operation is Stone Free Farms located three hours southeast of San Francisco, which specializes in growing and marketing specialty organic produce directly to upscale restaurants in the San Francisco Bay Area and beyond (Weise, 2000). Stone Free Farms is in the process of launching its second-generation website (www.americafresh.org). America Fresh is a just-in-time virtual farmers market for the organic fresh produce market. America Fresh uses information technology to create a local sustainable food system that links organic growers, chefs, and produce buyers into a community of partners.

Committed to the strategic vision of its founder and president, Brian Gardiner, America Fresh also creates websites and maintains back-office systems for its grower partners. When the high-speed system goes live, America Fresh will provide its grower partners with a digital camera, high-speed DSL connection, a web page, and a real-time database, allowing restaurants to look directly at what each grower has available that day. Farmers will photograph their produce, take the cameras inside, plug them into their computers, and upload shots to the web, where chefs at high-end restaurants will log in to place orders for next-day delivery.

A web presence such as America Fresh will function as a B2B marketplace for organic wholesale customers. Several advantages are provided by this type of real-time online system, including reductions in: (a) administration time and cost for growers, chefs, and produce buyers; (b) refrigeration and warehousing time and cost; (c) transport time and cost; and (d) environmental resource usage.

One major advantage of the approach being taken by America Fresh is that the information technology used for this type of supply chain management will be new.

The systems created for integrating the supply chain do not have to conform to older models, because this industry is relatively new and does not have high costs already sunk into older technology. It remains to be seen whether this real-time system will be able to function efficiently and effectively over time. However, if executed properly, America Fresh could become a model for other small producers in other sectors, and may be characterized as a Schumpeterian innovation in the long run.

Conclusions and Implications

We have examined the possible impacts of E-commerce on marketing channels for agribusiness. E-commerce could be used to generate economic rents if the information technologies reduced transactions costs. Within the Williamson framework, this reduction could either be in the form of direct transactions costs (such as reduced commissions), or indirect transactions costs (such as shrinkage). However, reduced transactions costs discussed within the framework of Coase and Williamson may or may not lead to changes in the structure of the marketing channel. Under the North framework, innovations occur within existing firms. This is clearly the case with the innovation of internet livestock auctions and B2C specialty fruits by Florida packers. Both of these cases involve existing firms which adopted E-commerce in order to reduce transactions costs.

In contrast, under the Schumpeterian framework, innovations are carried out by new firms replacing existing firms. In the case of E-commerce in agribusiness, it is difficult to find representative successful firms of a Schumpeterian nature. Several firms appear to have the potential of using E-commerce as a Schumpeterian innovation, but these firms have not yet achieved success. In addition, there have also been attempts by large existing agribusiness firms to create what has been described as the “world’s giant” of B2B E-commerce in agriculture. However, a plan by six major meatpackers to establish an internet-based B2B marketplace, for example, faced possible antitrust issues and, as a result, the plan has not yet been developed (Chambers *et al.*, 2001).

Why hasn’t a Schumpeterian innovation occurred in agricultural markets? Absence of such an innovation may be due to the significant startup costs involved in forming a supply chain based on E-commerce. It may also be due to the fact that consumer behavior has not been amenable to the use of E-commerce in agribusiness in the past. However, recent business research indicates consumer attitudes toward B2C are becoming more favorable and user groups are becoming less technology challenged due to better EC/IT applications and more sophisticated usage. In addition, B2B applications continue to expand as a result of transactions cost reductions. For example, consider the vendor relationships, warehousing (cross-docking) events currently driving order-entry purchase ordering systems, and back-end cost identification and data management associated with Wal-Mart.

Many E-commerce firms emerged in the 1990s only to fail. Most of these firms did not follow the North paradigm of path dependence, but represented new entrants into their respective agribusiness areas. In order for E-commerce firms to survive and

displace existing marketing channels in the long run, innovations must be large enough to be considered Schumpeterian. Time will tell if the E-commerce activities planned by firms such as America Fresh will succeed in displacing existing technology, thereby becoming Schumpeterian innovations. Future research is needed to examine, on a case-by-case basis, why E-commerce firms have failed and to what extent the Schumpeterian hypothesis is correct.

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