Ferentinos, K. P., K. G. Arvanitis, and Nick A. Sigrimis. 2006. Section 7.2 Internet Use in Agriculture, Remote Service, and Maintenance: E-Commerce, E-Business, E-Consulting, E-Support, pp. 453-464 of Chapter 7 Communication Issues and Internet Use, in CIGR Handbook of Agricultural Engineering Volume VI Information Technology. Edited by CIGR--The International Commission of Agricultural Engineering; Volume Editor, Axel Munack. St. Joseph, Michigan, USA: ASABE.

7.2 Internet Use in Agriculture, Remote Service, and Maintenance: E-Commerce, E-Business, E-Consulting, E-Support

K. P. Ferentinos, K. G. Arvanitis, and N. A. Sigrimis

Abstract. *This part of Chapter 7 deals with some recent advancements in the agribusiness sector due to the appropriate use of several services available through the Internet. Initially, the general categories of e-business and e-commerce are presented. The possible customer-centered interactions are analyzed and the characteristics of remote service and maintenance developed in agriculture are presented. Subsequently, the development of e-commerce in agriculture is investigated by presenting its characteristics, theoretical benefits, and impact factors. Finally, some representative applications of agribusiness on the Internet are presented and some conclusions on the successful adoption of e-commerce in agriculture are drawn.*

Keywords. *E-commerce, E-business, Agribusiness, Agri-food chain, Remote service and maintenance.*

7.2.1 Introduction

The recent development of information technology (IT) and its penetration into commerce and business transactions has led to the emergence of electronic business and commerce, usually referred to as *e-business* and *e-commerce*. The relevant actions of customer consulting and support have of course followed the same path, leading to the emergence of *e-consulting* and *e-support*.

E-commerce is simply defined as business transactions conducted over the Internet, or more generally through digital communications. Transactions may involve material goods, immaterial services (e.g., consulting and support), or rights and obligations. A variety of high-tech methodologies play an important role in e-commerce, but its backbone is the Internet. Access to Internet communication channels used in e-commerce is often open to everyone but is sometimes restricted and the messages exchanged may be rigidly standardized, as in Electronic Data Interchange (EDI). E-commerce also includes all inter-company and intra-company functions (such as marketing, finance, manufacturing, selling, and negotiation) that enable commerce as well as use of electronic mail, EDI, file transfer, fax, video conferencing, workflow or interaction with a remote computer.

7.2.2 Categories of E-Business and E-Commerce

Transactions performed in e-commerce can be categorized according to the partners involved: consumers, business, and government. Only three of the six possible combinations are presently important: business-to-consumer (B2C), business-to-business (B2B), and consumer-to-consumer (C2C) [1].

- *Business-to-consumer (B2C)* e-commerce involves retailing products and services to individual shoppers.
- *Business-to-business (B2B)* e-commerce involves the sales of goods and services among businesses.
- *Consumer-to-consumer (C2C)* e-commerce involves consumers selling directly to other consumers.

Across all industries, global B2B e-commerce was valued at US $356.7 billion in 2000, which represented around 60% of global e-commerce [2]. According to some analysts, B2B represents close to 80% of all e-commerce transactions and could represent as much as 87% by 2004 [1,3]. That year, worldwide B2B e-commerce revenues could reach nearly US $2.8 trillion [4]. The contrast in the development of B2B e-commerce as compared to B2C may be linked to the ease and cost effectiveness with which offline B2B processes can be replicated online compared to more complex B2C processes. In addition, B2B commerce can reduce errors in commerce-related documents from 20% down to less than 1% [5]. Recently, C2C e-commerce has gained a large portion of global e-commerce due to the development of web auction sites (eBay, uBid, etc.) which allow people to sell their goods to other consumers by auctioning them off to the highest bidder.

Another way of categorizing e-commerce is in terms of the development approaches that are followed by individual e-businesses. In [6] and [7], three categories are identified, based on the primary drivers in their development:

- *E-marketplaces* are neutral to buyers and sellers, seeking to innovate in the core Internet technology taking into account the interests of both buyers (characteristics and needs) and sellers (margin requirements). With the e-marketplaces, also termed electronic hubs or *e-hubs*, companies can link up to many buyers without having to create point-to-point connections to each and can potentially find new customers. Companies purchasing products don't have to manage several different systems for buying from various suppliers and can save money by comparing prices and purchasing from a wide range of companies [8].
- *E-distribution sites* are designed to serve sellers by removing and replacing the existing distribution chain. They must ensure that current sales are not alienated and also ensure that the best orders are not skimmed off leaving other channels to pick up the smaller and more expensive orders.
- *E-procurement sites* are designed to serve the buyers by aggregating online buyers and using volume to force prices down. They are unattractive to distributors due to price transparency which could potentially erode savings achieved by some cheaper sales channel.

E-marketplaces are expected to emerge as a dominant force in e-commerce, accounting for 56% of the value of all B2B transactions by 2004, compared to 7.5% in 2000 [6]. The advantage of an e-marketplace is its ability to replicate offline behavior. This is achieved by offering a range of applications tailored to meet the needs of both target buyers and sellers [9].

7.2.3 Customer-Centered Interactions

An important trend observed in e-commerce is in the supply of information. The Internet provides companies with new channels of communication and interaction that can create closer yet more cost-effective relationships with customers in sales and marketing as well as in consulting and support. Companies can use the web to provide ongoing information, service, maintenance and support, creating positive interactions

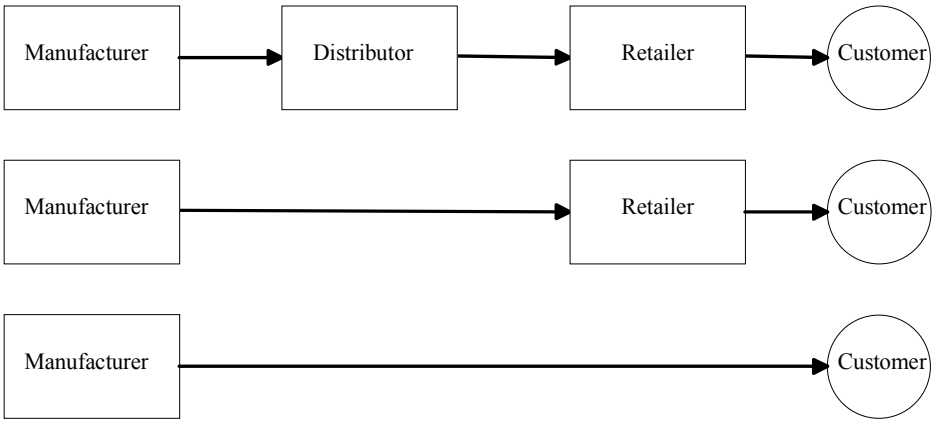

Figure 1. Disintermediation in a value chain.

with customers that can serve as the foundation for long-term relationships and encourage repeat purchases [1]. New approaches to customer service and support have been inspired by the web and other network technologies. Customer questions can be answered with e-mails through the web sites of the companies or by providing helpful information in the web site that can give advice and answers to the customers. In this way, the web is used as a medium through which customers can interact with the companies, at their convenience, and find information on their own that previously required a human customer support expert. According to [1], automated self-service or other web-based responses to customer questions cost one-tenth the price of a live customer service representative on the telephone. In addition, the current development of technology allows the experts of some company to remotely manage and service products (mainly software-based products) via the Internet or direct modem connections.

With the capability of direct sales of the manufacturers' products to retail customers over the Internet, the intermediaries such as distribution or retail outlets are bypassed. Eliminating intermediaries in the distribution chain can significantly reduce purchase transaction costs. To pay for all the steps in a traditional distribution chain, a product may have to be priced as high as 135% of its original cost to manufacture [10]. In addition, with this elimination of intermediaries, companies can achieve higher profits while charging lower prices. The elimination of organizations or business process layers responsible for intermediary steps in a value chain is called *disintermediation* (Figure 1).

7.2.4 Remote Service and Maintenance in E-Commerce and E-Business

Service and maintenance in e-commerce have as targets both the operation of the company and the product that reaches the customer. Businesses that are seriously pursuing e-commerce and e-business need special tools for maintaining their web sites. These tools include web server and e-commerce server software, customer tracking and personalization tools, web content management tools and web site performance

monitoring tools. According to [1], the functions that specialized e-commerce server software must perform for both B2C and B2B e-commerce include the following:

- setting up electronic storefronts and electronic catalogs to display product and pricing information;
- designing electronic shopping carts so consumers can collect the items they wish to purchase;
- making shipping arrangements;
- linking to electronic payment processing systems;
- displaying product availability and tracking shipments;
- connecting to back-office systems where necessary; and
- reporting on both the business transacted through the site and the functioning of the site.

Customer tracking and personalization tools have three main goals [1]:

- collecting and storing data on the behavior of on-line customers and combining that data with data already stored in the company's back-office systems;
- analyzing the data in order better to understand the behavior of on-line customers; and
- identifying developing customer trends.

Web content management tools consist of software that facilitates the collection, assembly and management of content on a web site, intranet or extranet, while web site performance monitoring tools consist of software for overseeing the speed of downloading web pages, performing web transactions, identifying broken links between web pages and for pinpointing other web site problems and bottlenecks [1].

The second main target of remote service and maintenance is the actual product. This includes the customer support via the communication channels between the company and the customer, which have been seriously expanded with the development of the telecommunication technology and the Internet, as explained in the previous section, but it also includes direct product maintenance through the Internet or direct modem connections. Several products, mainly in cases where software is involved, include the capability of remote service and maintenance. The company's expert can directly connect to the product and perform troubleshooting, routine service, software upgrades, etc. Many of these procedures can be done automatically, by connecting to special portals in the company's web site, even without the company's expert.

7.2.5 E-Commerce in Agriculture

During recent years, e-commerce has found its way to agriculture. As the Internet continues to become more popular among people who deal with agricultural businesses of any type, e-commerce finds further applications in agriculture. Participation in e-commerce requires that both buyers and sellers have access to the Internet and that they are able to use the required hardware and software effectively. At the level of business-to-business, common agribusiness B2B transactions such as buying, selling, trading, delivering, and contracting seem to be natural targets for conversion to e-commerce [11]. In agriculture, the B2B and B2C categories of transactions are often

referred to as agribusiness-to-agribusiness (A2A) and agribusiness-to-grower (A2G) [12].

Many theoretical benefits of e-commerce in agriculture can be identified:

- *Promotion of information flow* [13]—The exchange of information about agricultural products, their characteristics, advantages, disadvantages, etc., can be greatly increased through the information highways of the Internet during e-commerce transactions. In addition, Internet technology provides the opportunity to link individual actors in the food production chain together, irrespective of geographic location. This has the potential to improve market access through online transactions and by reducing geographic obstacles to market reach, such as time and distance.
- *Market and price transparency* [13,9]—Online access to product and price information allows comparison of products and increases price transparency. Price differentials resulting from geographic location can diminish because of increased competition. This may benefit farmers with regard to input prices but may reduce the prices received for their products. This may be particularly true where many existing products are not differentiated, are required on a regular basis, and where there is a heavy reliance on input supplier expertise in choice of product [9].
- *Reduction or elimination of transaction costs* [14,15]—With the application of e-commerce, many transactions through the supply chain are either eliminated or simplified. In this way, transaction costs are drastically reduced or even eliminated.
- *Increase in online cooperatives* [9]—The processes of e-commerce transactions give emergence to new opportunities for furthering the concept of cooperatives. From the perspective of farmers, e-cooperatives provide a solution for small businesses to increase critical mass [16].

The Internet plays a role in agribusiness both as a new marketplace and as an information resource. Numerous applications have been developed by different interest groups. Applications in the marketplace can be categorized from a farmer's viewpoint, including services, outputs, and factors of production and inputs [12]. Services, inputs, and production factors are generally purchased via the Internet at a fixed price, whereas outputs are generally traded through an auction. This is perhaps because many of the outputs are perishable and therefore the market price is more sensitive to supply and demand.

The development of e-commerce in agriculture is of course strictly linked with the adoption of the Internet by, mainly, the farmers. Reports show that farmers are slightly behind the general population in adoption [17-19]. In the United States, the proportion of farmers who had access to the Internet had risen from 13% in 1997 to 29% in 1999 [20]. By June 2000, 58% of Australian farms had computer access and 34% had Internet access [21]. In Germany, 78% of commercial farmers with Internet access use it for electronic banking, while 28% use it to purchase goods and 19% use it for selling goods [22]. However, not all farmers use Internet access for productive purposes, and

social and recreational uses may also be important. In general, larger farms tend to adopt both Internet technologies and e-commerce behavior more rapidly [18]. However, the type of farm/non-farm agribusiness appears to be even more important than the size, and accounts for small farm opportunities online. This often relates to niche products and unique market position [23]. When it comes to actual online commerce activity, about 15% of farmers engage in some form of farm-related buying and selling online, but this online activity constituted only 0.3% of total farm commerce in 2000 [24].

Goldman Sachs [25] believes that about 12% of total US agricultural sales could migrate online by 2004. This translates into a $120 billion by 2004, which is an important increase compared to the $34 billion in 2000 [26]. However, [27] concludes that despite significant growth in use of the Internet by farmers, it is still far from universal and likely to stay so for some considerable time. The reasons for non-adoption according to the same research have to do with utility, relevance, and affordability of the product, though technical limitations (especially speed of rural telecommunications links) still have an influence [27].

Goldman Sachs also argues that the potential for B2B e-commerce is greater in industries with the following characteristics: a highly diffuse supply chain; pressure to control costs; complex product specifications; processes accounting for at least 20% of total costs; and technological innovation is part of the industry's culture.

The increasing adoption of information technology leads of course to direct production gains and, at the same time, to reductions in operating costs. There are several areas where this might happen, including:

- better retrieval and evaluation of available data for management purposes;
- development of management decision support systems;
- development of processes for quality assurance and external regulatory compliance requirements;
- better links to remote sensing and geographic information systems (GIS) data;
- better links to technical and other information;
- better links to agricultural suppliers;
- more direct feedback from customers and consumers;
- improved supply chain management (see Chapter 8, Section 8.2); and
- opportunities for marketing and other networks to emerge.

According to [28], there are three major factors impacting the development of e-commerce in agriculture:

- *Industry structure*—The structure of agribusiness industries has changed in recent years. Some major consolidations that have taken place at all levels of the value chain can impact agribusiness e-commerce in three ways: (1) reduction of the need to electronically coordinate fragmented marketplaces [29], (2) creation of barriers to the development of transparent electronic marketplaces [30] and (3) development of internal barriers to adoption [28].
- *Product complexity*—The increasing complexity of products being sold in agricultural markets slows down e-commerce development in agriculture. This

complexity is both traditional and end-user driven. Agricultural products, unlike manufactured goods, are partly uniform and their prices depend on several factors. Some quality standards like product grades help simplify product description, but time and location factors also influence the price of a product. In addition, local prices also may vary constantly. With current technology, the cost in time and effort to the buyer of searching for all these attributes may outweigh any advantages the buyer may gain [28]. The end-use driven products that add to the complexity of products have evolved lately due to the focus on consumer demands for healthier, more convenient and more flavorful foods, and also due to the development of trait-specific products valuable to processors along the value chain [28].

- *The high-touch nature of transactions*—It is undisputable that farms have become increasingly more business-like in recent years and farmers operate in an A2A environment. However, there is great evidence that personal relationships still play a very important role in all transactions in agribusiness. There are some that argue that agriculture is fundamentally driven by relationships [31]. Farm operator evaluation by farm managers relies more on trust and recommendations than production factors [32]. Personal relationships even have an impact on land prices [33].

Statistical results presented in [34] make the impact of e-commerce on the agri-food sector more specific. A slow rate and a small extent to which the adoption of e-commerce is taking place is identified. Similar problematic situations can be resolved by the proposal of specific development directions [35] and the identification of characteristics that are associated with successful e-commerce firms throughout the agri-food chain markets [36]. In addition, the market complexity of the agri-food sector is particularly high, mainly because of the large product variety and different sets of market situations [37]. Thus, specialized systems for electronic trade that identify that complexity of the transaction process are required. Based on that concept, a software prototype is developed in [38] that flexibly addresses the different needs in agri-food markets and explores different process alternatives in transaction processes. The resulted system is evaluated in [39] and its performance shows that electronically supported transaction processes in specific agricultural market applications are more efficient than the respective traditional transaction processes.

Therefore, it is clear that global challenges in the agri-food sector must be met with IT used far more than currently [40]. To realize such a high level of IT use in agribusiness will take cooperation, for example [40]:

- cooperation between different areas of competence such as competence in it or competence in business and market management;
- cooperation between groups of enterprises from all stages of the food supply chain, extension organizations, market organizations, and other related services;
- cooperation between the providers of IT services to secure the technical feasibility and efficiency of digital integration and to adapt technology to content;

- cooperation among small-scale enterprises, especially farmers, to be able to utilize the emerging digital environments and to open opportunities for virtual cooperation;
- cooperation between users, research, extension, and system design to arrive at applications which better fit the operational needs of users; and
- cooperation in the development of system marketing strategies and the development and implementation of training opportunities.

7.2.6 Internet Applications in Agribusiness

Numerous Internet applications have been developed in the agribusiness sector by different interest groups. These applications can be divided as market-specific and information-specific. In the first case, that is, in the marketplace, they can be categorized under three broad themes from a farmer's viewpoint [41]:

- *Factors of production and inputs*—This refers to the Internet sites that trade all possible items that can contribute to agriculture, like land [42], agricultural chemicals [43], machinery and equipment [44], and fertilizers [45].
- *Services*—This refers to the sites that offer online logistical, transport, and storage services. Some examples are banking facilities such as loans [46], insurance [47], legal services [48], and even some innovative applications like trading services of milk quotas [49].
- *Outputs*—Applications on the output side are generally in the form of online auctions. Some representative applications include cattle auction sites [50,51], hay [52], fish and fish products [53], specialty market products like walnuts [54] or wine and related items [55].

The information-specific Internet applications in agriculture can be categorized in areas such as information itself, management tools, and links to regulatory bodies [41]:

- *Information*—This refers to farm magazines that are online, such as *Farmers Weekly* [56] and *Hoard's Dairyman* [57], sites that provide market information [54, 58] and analysis [59], online weather reports [60], and specialist advice [61].
- *Management tools*—This refers to online tools that include calculators, databases, information tracking, and analysis tools and electronic forms. Examples of calculators include a beef management profitability calculator [62], a milk quota calculator [63], and a loan calculator [64]. Information tracking and analysis examples can be found on the accountancy packages available at [63] while a representative database application is realized in [58].
- *Links to regulatory bodies*—Many sites provide links to regulatory bodies for supply of official publications, reports, press releases, and other tools. Examples include the European Commission, Agriculture Directorate-General [65], the Organisation for Economic Co-operation and Development [66], the World Trade Organization [67], and the National Farmers' Union of the UK [68].

7.2.7 Conclusions

The commercialization of the Internet has caused agribusiness firms to rethink their distribution channel. E-commerce provides firms with the ability to reach new customers and old customers in new ways. In addition, e-commerce also allows firms to tap new and old suppliers through new and innovative channels. These possibilities have raised the expectations of improved efficiency and substantial cost savings. The process and function view of the supply chain is used to guide the analysis into Internet/e-commerce adoption by agribusiness firms. The ability of the Internet to reduce transaction costs through improvements in transaction, information, and negotiation functions of the supply chain is associated with higher probabilities of Internet/e-commerce adoption among agribusiness firms [69].

It is evident that, despite the barriers that slow down e-commerce adoption in the agricultural sector, the development of agribusiness e-commerce to date will lead to the successful wide adoption of e-commerce in agriculture. Today's high-tech transactions mean that e-commerce players have to lead individual users toward a new way of conducting business. The nature of adoption of innovation will create opportunities for those who cater to individual needs for learning and training [70]. E-learning and e-training will become in some cases the prerequisite and in other cases the extension of e-consulting and e-support.

References

1. Laudon, K. C., and J. P. Laudon. 2002. *Management Information Systems: Managing the Digital Firm*. Upper Saddle River, NJ: Prentice-Hall Inc.
2. Goldman Sachs. 2000. Technology: Internet-Commerce, United States.
3. Franck, C., 2000. *The New Economy and Agriculture,* 2-9. Normandy University.
4. Enos, L. 2000. Report: B2B still driving e-commerce. *E-Commerce Times* December 11.
5. Kenny, D., and J. F. Marshall. 2000. Contextual marketing. *Harvard Business Review* November-December.
6. IDC. 2000. eBusiness trends. IDC Newsletter. Accessed from www.idc.con /newsletter.
7. Lynch, J., D. Hickey, T. Grogan, D. Daly, M. Dangerfield, and J. MacNabola. 2000. Irish Farming Online, Agriculture Online: An Industry Analysis. Accessed from www.agriculture.com.
8. Dalton, G. 1999. Going, Going, Gone!. *Information Week* October 4.
9. Wilson, P. 2000. An overview of developments and prospects for e-commerce in the agricultural sector. European Commission, Agriculture Directorate–General.
10. Mougayar, W. 1998. *Operating Digital Markets*. New York, NY: McGraw-Hill.
11. Shapiro, C., and H. Varian. 1999. *Information Rules*. Boston, MA: Harvard Business School Press.
12. Wheatley, W. P., B. Buhr, and D. DiPietre. 2001. E-Commerce in agriculture: Development, strategy, and market implications. Staff Paper P01-6. Minneapolis,

MN: University of Minnesota, Dept. of Applied Economics. Accessed from agecon.lib.umn.edu.
13. Poole, B. 2001. How will agricultural E-Markets evolve? *USDA Outlook Forum.*
14. Porter, M. 2001. Strategy and the Internet. *Harvard Business Review* 79(2): 63-78.
15. Thompson, S. 1996. Potential effects of information technologies on the economic performance of agricultural and food markets. *Symposium on Global Restructuring of Agro-Food Markets: Need for Change in Marketing Policies.*
16. Lavouras, S. 2000. Trading on the internet challenges and benefits for buyers. *Proc. of E-Commerce for Agribusiness*.
17. Nielsen Media Research. 2001. Various Internet demographic and trend reports. Accessed from www.netratings.com. New York, NY: ACNielsen.
18. Ernst, S. 2001. Outlook for IT and E-Commerce in Agriculture. 2002 *Agricultural Policy and Outlook Guide* December, Farm Progress Publications.
19. National Agricultural Statistics Service. 1999. *Farm Computer Usage and Ownership.* Washington, D.C.: USDA.
20. Just, D. R., and R. E. Just. 2001. Harnessing the internet for farmers. *Choices* 2nd Quarter 2001: 36-40.
21. Australian Bureau of Statistics (ABS). 1999-2000. *Use of Information Technology on Farms, Australia*, Cat. No. 8150.0. Canberra, Australia.
22. Mueller, R. A. E. 2001. E-Commerce and entrepreneurship in agricultural markets. *American J. Agricultural Economics* 83(5): 1243-1249.
23. Ernst, S., and M. Tucker. 2002. "Agri-Culture": A new look at adoption and diffusion on information technology. *International Meeting of Agricultural Communicators in Education.*
24. Hopkins, J., and M. Morehart. 2001. Recent findings on farm internet use. *Symposium Paper, American Agricultural Economics Association Meeting.*
25. Goldman Sachs. 1999. B2B: 2B or Not 2B?: An excerpt, September.
26. Little, D. 2000. Old MacDonald has a web site. *Business Week E.Biz.* May 15: EB83-EB88.
27. Warren, M. 2003. Farmers and the internet, six years on. *EFITA 2003 Conference.*
28. Leroux, N., M. S. Wortman Jr., and E. D. Mathias. 2001. Dominant factors impacting the development of business-to-business (B2B) e-commerce in agriculture. *International Food and Agribusiness Management Review* 4: 205-218.
29. Nicolaisen, R. 2001. How will agricultural e-markets evolve? *Proc. of the USDA Outlook Forum.*
30. Dolan, R. J., and T. Moon. 1999. Pricing and market making on the Internet. *Harvard Business School Case Study,* No. 9-500-065.
31. Moss, L. A. 2001. Who wins and loses and how will e-market affect rural America? *Proc. of the USDA Outlook Forum.*

32. Barry, P. J., N. Sotomayor, and L. A. Moss. 1998. Professional farm manager's views on leasing contracts and land control: An Illinois perspective. *J. American Society of Farm Managers and Rural Appraisers* 1998/1999: 15-19.
33. Perry G., and L. Robinson. 1999. Personal relationships: Do they influence the sale price of land? *Proc. of the Western Agricultural Economics Association Annual Meeting.*
34. Baourakis, G., M. Kourgiantakis, and A. Migdalas. 2002. The impact of e-commerce on agro-food marketing; the case of agricultural cooperatives, firms and consumers in Crete. *British Food J.* 104(8): 580-590.
35. Fritz, M., T. Hausen, and G. Schiefer. 2004. Developments and development directions of electronic trade platforms in U.S. and European agri-food markets: Impact on sector organization. *International Food and Agribusiness Management Review* 7(1).
36. Montealegre, F., S. Thompson, and J. Eales. 2004. An empirical analysis of the determinants of success of food ad agribusiness e-commerce firms. *2004 International Food and Agribusiness Management, Focus area: Contribution of Technology to Food Chains*.
37. Vatn, A. 2002. Multifunctional agriculture: Some consequences for international trade regimes. *European Review of Agricultural Economics* 29(3): 309-327.
38. Hausen, T., and G. Schiefer. 2003. Electronic trading processes in agrifood markets: Options and experimental experiences. *EFITA 2003 Conference.*
39. Hausen, T., and G. Schiefer. 2004. Electronic transaction processes on agrifood markets: Experimental experiences and evaluation. *2004 AFITA/WCCA Joint Congress on IT in Agriculture.*
40. Schiefer, G. 2003. New technologies and their impact on agriculture, environment and the food industry. *EFITA 2003 Conference.*
41. Wilson, P. An overview of developments and prospects for e-commerce in the agricultural sector. European Commission, Agriculture Directorate-General.
42. www.LandAndFarm.com
43. www.eharvest.com/agchemical
44. www.tractorsonline.com
45. www.IFI.ie , www.bibbyireland.co.uk , www.gold-dust.com
46. www.amconline.com
47. www.Rcis.com
48. www.foodtrader.com
49. www.milkquota.com
50. www.breednet.com , www.cattleofferings.com
51. www.farms.com
52. www.homefarm.com/hfg
53. www.pefa.com
54. www.agex.com
55. www.wineryexchange.com/jsp/index.jsp
56. www.fwi.co.uk
57. www.hoards.com

58. www.agcentralonline.com
59. www.forester.com
60. www.progressivefarmer.com/weather/default.asp
61. www.agrihelp.com
62. www.fwi.co.uk/live/markets/mlcfront.html
63. www.AgriNet.ie
64. www.amconline.co.uk/amc/html/home/frameset.html
65. europa.eu.int/comm/dgs/agriculture/index_en.htm
66. www.oecd.org
67. www.wto.org
68. www.nfu.org.uk
69. Henderson, J., F. Dooley, and J. Akridge. 2000. Adoption of e-commerce strategies for agribusiness firms. *American Agricultural Economics Association Annual Meeting.*
70. Judson, B., and K. Kelly. 1999. Hyper wars: Eleven Essential Strategies for Survival and Profit in the Era of Online Business. New York, NY: Touchstone.