



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

The Role of the Federal Government as Information Technology Provider to the Agricultural and Food System

Henry M. Bahn and Gregory Parham
Cooperative State Research, Education, and Extension Service, USDA

In a recent address to the U.S. Department of Agriculture (USDA) Economists Group, Katherine R. Smith, director, Wallace Institute for Alternative Agriculture, cited the public good argument as a necessary but no longer sufficient justification for the public funding of agricultural information (Page). She reviewed the historical arguments of limited access to and availability of information, and the importance of both access and availability as criteria for market efficiency. Smith also noted that the traditional foci of agricultural research and information are becoming strained by public demand to reduce the size and scope of government, attempts at deficit reduction, growing public awareness that neither the government nor science can provide solutions to every problem, and the phenomena of declining real wages. The latter are a particularly worrisome issue, as publicly-funded data generation and information distribution must now compete for funding with broader, more visible programs and entitlements such as Social Security and Medicare.

Introduction

In 1976 the National Extension Agricultural Public Policy Committee prepared a volume entitled *Marketing Alternatives for*

Agriculture for the Senate Subcommittee on Agricultural Production, Marketing, and Stabilization of Prices. It presented a dozen papers exploring alternatives to relieve the stresses agricultural markets were facing during the early and mid 1970s. The problems were remarkably similar to those facing the U.S. agricultural sector today—concentration, vertical integration, market power, access to market outlets, pricing disparities.¹ The list of authors read like a veritable *Who's Who* of government and academic agricultural economists: Henderson, Armbruster, Padberg, Holder, Sporleder, Torgenson, Haskell, Phillips and Knutson, to name a select few.

Virtually all of the 1976 papers, each of which dealt with a particular marketing alternative, referred to the need for and importance of market information. Most made a strong case for the public gathering and distribution of at least part of that information, but perhaps Moulton and Padberg best summed up the dilemma facing agencies of public intervention in private markets for information gathering purposes:

...we (in the United States) have a basic belief in the usefulness of private initiative in the evolution of economic efficiency. Yet for private access to be effective, individual investors need

information. If access to private opportunity is to be broadly spread, this information must be public. So the complex organizational form (of private markets) represents a dilemma: it is usually technically efficient, but it usually erodes the quality and quantity of public information (p. 36).

The acceleration of some of the very issues that concerned our peers two decades ago has changed the modern agricultural marketing environment substantially. Perhaps a partial result of increased consolidation and vertical coordination is the emergence of a more consumer-oriented agricultural sector, leading Streeter, Sonka and Hudson to construct a more contemporary view of the coordination function within the sector. Under this alternative, retailers' attentions are focused on the identification of consumer preferences, the adaptation of their products accordingly, and the procurement of raw materials and other inputs that are more suitable to the production of those products. Information technology takes on a critical role of facilitating discovery in this type of alternative decision-making context (Figure 1). The (former) Office of Technology Assessment concurred: "Information technology enables firms to identify new markets and customize products to satisfy changing markets" (U.S. Congress, 1995, p. 6).

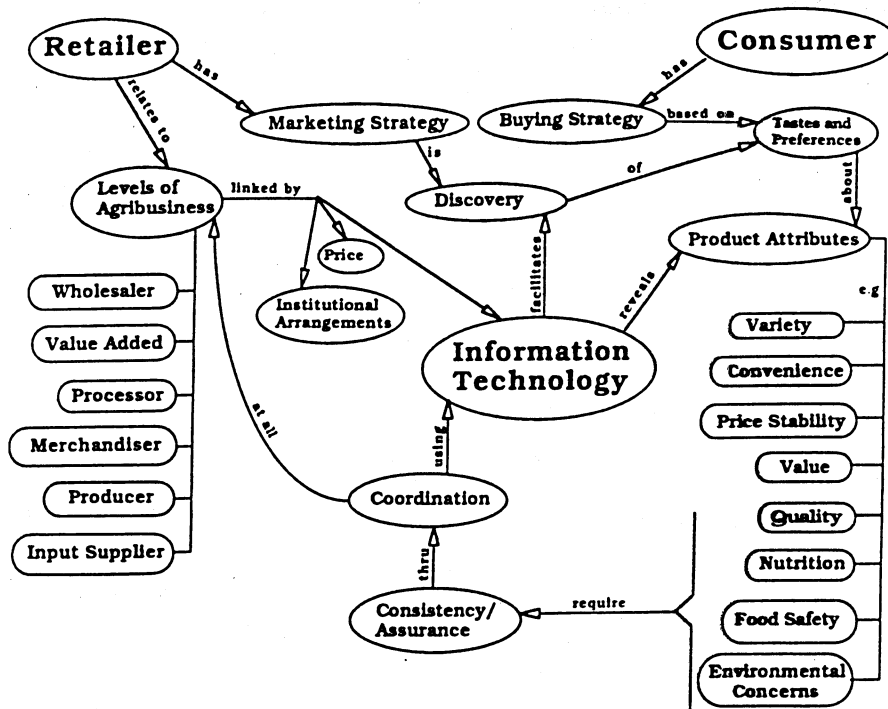
This consumer orientation, coupled with technology adoption and more demanding management methods (e.g., just-in-time delivery), is refocusing the coordination function. Vertical integration and the increased use of contracting help ensure the availability and timely delivery of properly produced raw materials and inputs (U.S. Congress, 1995).² With or without increased contracting, a more consumer-oriented agri-

business sector needs to send more explicit price signals to producers or develop an alternative to prices to communicate consumer demands up through the marketing chain. In the short- to intermediate-run this is most likely to be accomplished through more liberal use of price premiums and discounts, especially in the less vertically integrated markets. However, the grades and standards that form the basis of premiums and discounts, and that served a commodity-oriented agricultural sector so well for so many years are not sufficient to provide consumer-oriented primary producers with the necessary detail regarding desired intrinsic quality characteristics.

Phillips notes that, "Structural changes and vertical coordination are accomplishing some of the objectives of public marketing programs, such as marketing orders and market information policies" (p. 56). Coupled with the adoption of value-adding new technologies, this leads Phillips to speculate that some USDA marketing policies are likely to be de-emphasized or curtailed in the future, making Smith's concern regarding competition with broader government programs for public funding all the more ominous. At the same time, the passage of the Government Performance Reporting Act (GPRA) has placed additional stress on government agencies that carry out activities such as the provision of public information, namely the need to justify future funding by identifying and reporting the outcomes and impacts of public expenditures.

Recently the National Performance Review (NPR) reaffirmed the need for the government to discard old assumptions and embrace new concepts about organizations that are important for the delivery of services to citizens. Recent developments in the information infrastructure make it clear that

Figure 1. An Alternative View of Coordination in the Food and Agribusiness Sector



Source: Streeter, Sonka and Hudson, Fig. 1b, p. 1467.

producers, managers, merchants and analysts must move rapidly to accommodate information management and technology issues. For example, the increased use of negotiated contracting is an assumed characteristic of contemporary consumer-oriented agricultural markets. Contracting is a double-edged informational sword. While it has the potential to reduce transactions costs (Nelson and Turner, 1995), effective contracting places informational demands on both negotiating parties. Farmers and ranchers have long been viewed as particularly vulnerable to a weak negotiating position due to a lack of access to two types of information. They

need comparative price data (spot and forward, local and terminal) to evaluate their spatial and temporal positions vis a vis the market as a whole. They also need access to private treaty data that are typically kept confidential between the negotiating parties. Petzel suggests that the comparative price data can be adequately supplied by the private sector.³ He notes that the public role in this type of information gathering is diminished: "The arguments from the 1930s for the government to perform this function are not now valid" (p. 258).

With respect to private treaty data, Petzel reverts back to the public good argument.

As negotiated contracts become more dominant, and as these transactions are generally conducted in private, a net loss in market efficiency can result.⁴ The irony of this information dilemma is not lost. Petzel notes, "The most ironic situation is the increasing reliance on private basis trades, where the foundation of the contract is a public price" (p. 258).

Streeter, Sonka, and Hudson, in Figure 1 make information technology⁵ the vital discovery link between the food and agribusiness sector and the consumers of its products. To the extent that the federal government still has a role in facilitating trade, telecommunications, computers and networks are rapidly becoming the vital link to the achievement of public price and information gathering efforts, and to the formation of strategic links with other public and private partners. The impact of these systems is being felt throughout the agricultural sector, although not at the same pace for all participants. The government, especially USDA, has a vast amount of market-related information available on electronic bulletin boards, on magnetic and optical media, and on the Internet. Providing broad public access to this collection, and verifying its usefulness, is a major component of the emerging national information infrastructure.

Information Technology: From Dissemination to Access

As the information infrastructure is further refined and deployed, producers, managers, analysts and executives will deal with a bewildering array of new technologies. However, there are some basic principles that undergird most of the changes. First is the move—from dissemination models as the

driving force of information distribution to models that emphasize *access to* digital information in a variety of media. Access to digital information presupposes the second principle, that information should be made available in digital form, forming a digital core from which text, graphics, audio, video and multimedia will ultimately emerge.⁶

The trend toward digitization of information resources is unmistakable and the most progressive firms are now positioning themselves to participate. The federal government is actively engaged in increasing access to public information through the Government Information Locator Service (GILS) and the Americans Communicating Electronically (ACE) initiatives.

GILS is a proposed joint cooperative effort between the Office of Management and Budget and the Information Infrastructure Task Force to promote establishment of an agency-based system to help citizens and organizations locate and use public information resources throughout the government. When operational, GILS will identify information resources, describe the information available in those resources, and provide assistance in how to obtain the information.

The ACE is a voluntary group of agency staff in federal, state and local governments, nonprofit organizations and coalitions, public libraries, public and private universities, communities and individual citizens. The goals of ACE are to 1) create and foster information access and facilitate interactive communications between citizens and their government; 2) broaden public participation in the development of government communications policy, and 3) provide citizens with access to a wide range of public information stored electronically.

The Internet

The Internet is a global network of interconnected networks used to share and provide access to information, not to mention add dramatically to the world's supply of acronyms.

More than 40 million users on more than 40,000 independent computer-based networks are currently part of the world-wide Internet, and the rate of growth continues to be explosive as more networks and users are connected. Adherence to a homogeneous collection of software protocols, known collectively as Transmission Control Protocol/Internet Protocol (TCP/IP), is what allows the Internet to function on a variety of different hardware platforms. Resources are shared globally on the Internet and it is increasingly used for communications, cooperation and collaboration in the work place.

Electronic mail is currently the most popular application of the Internet and other commonly used applications include file transfer protocol (FTP) and remote login (TELNET). Using these and other protocols, information providers and users worldwide have created public and private electronic communities that are neither temporally or spatially limited. The downside of this technological innovation is information overload.

Networked Information Publishing, Discovery and Retrieval

Providing access to a digital core of information on electronic networks can be a daunting task, but there are a variety of tools emerging that can help ease the process.

The client/server model of computing and communications is widely used to provide access to information resources. An information server functions as a repository for data or information on a particular subject or topic and the server software interacts with the client software on the end users' computer to provide access.

Electronic mail is the simplest and least expensive means of providing access to networked digital information. Users can send electronic mail virtually anywhere in the world. Information can be delivered to a general or specific group of recipients through distribution lists and self-subscribed mail groups. Increasingly, organizations are publishing their information in digital form and several methods are available for electronic publishing on the Internet.

FTP, Gopher Protocol, and Hypertext Transfer Protocol (HTTP) are three of the most popular ways to publish information on the Internet. File Transfer Procedure (FTP) provides interactive access that allows remote users to retrieve files published on a host server. Gopher provides access to published information via hierarchical menu structures that link one Gopher server to another, while HTTP provides access to linked documents that integrate text, sound and images. Each of these methods uses a host computer system, or information server.

Another means of providing access is the TELNET protocol that connects users to a remote computer and allows them to log on as if they were directly connected.

These protocols make the digital information on a single computer available across the network to users of other computers. The level of interactivity of many of these

protocols encourages collaborative work and telecommuting.

Discovery and retrieval tools are perhaps the most important elements in the emerging digital environment as they enable users to search for the information they need and direct the output of those searches.

The World Wide Web (WWW) provides access to digital resources through hypertext browsing of databases. Client software is used to interact with WWW servers and provides interactive access to text, image, audio and video information resources.

The advent of "spiders" (software search agents) on the WWW has enhanced the search, discovery and retrieval process.

Beyond Access to Engagement, If Not Enlightenment

To realize the full potential of information technology, private users must fully tap the existing pool of expertise within their firms and critically evaluate past practices and assumptions of information management and technology. As the communications and computing environment changes, so must organizations.

The National Performance Review (NPR) report, *Reengineering Through Information Technology* (Office of the Vice President), stresses the need to provide and strengthen clear, strong leadership to integrate information technology into the business of government. Additionally, the report addresses the need to develop integrated electronic access to government information and services.

The ascendancy of the personal work station and distributed, networked computing based on client/server models has eclipsed the need for more centralized systems and

thinking. As firms are redefined as interconnected webs and networks rather than rigid hierarchies, supporting telecommunication and computing infrastructure will enable managers and analysts to interact in new, crosscutting ways and move beyond access to full engagement. The result will be the provision of quality services and broad access to information that is timely, accurate and economically beneficial to those with access to it.

One such benefit is the enhancement of market efficiency and the reduction of marketing transactions costs. Both of these benefits are at least partially related to increased vertical coordination and private treaty transactions. Whether the net social benefit is positive or negative remains to be seen.

The personal work station is not yet ubiquitous, especially at the farmer-manager's level. Those who lack the requisite computer skills, the computer hardware and software, and the infrastructure to fully adopt the information technologies that many of us take for granted will find themselves operating in a virtual information vacuum, or at best at the tail end of the information chain.

Nor is there yet consensus regarding the type and extent of information sharing that processors will engage in. Given the yield and quality variability inherent in agricultural production, processors of intermediate and final products will be reluctant to fully share information regarding their needs if they perceive that it places them at a competitive disadvantage at procurement time.

Conclusions

As the digital information revolution continues to unfold, dramatic changes in the

global economy will become increasingly evident.

The critical barriers of spatial and temporal separation, the decoupling of resources from their use, and the reliance on outmoded organizational structures are crumbling under the relentless onslaught of applied information technologies. These technologies have eroded the meaning and importance of past assumptions about access to data and information and, consequently, the role of the private and public sector in the provision of data and information.

As we continue to learn to harness the power of a diverse array of information technologies, we will be drawing on our centuries-old experience of harnessing the power of animals during the agricultural revolution and machines during the industrial revolution. That experience has taught us that we cannot always know the outcome of our inventions or how they will be redesigned and applied by future generations.

As we approach the twenty-first century, public access to timely and accurate market information will not be enough to maintain or enhance private sector competitiveness. Producers and marketers will find that knowledge of networked integrated information systems is a prerequisite to survival in the global marketplace.

No one knows for sure what the role and scope of the federal government in providing information technologies in the agricultural and food system of the twenty-first century will ultimately entail, but maintaining public access to market information will continue to be a critical need that can at least partially be addressed efficiently and comprehensively by government agencies such as USDA.

NOTES

The authors are National Program Leaders in Rural, Economic, and Social Devel-

opment, and Plant and Animal Production, Protection, and Processing, respectively, CSREES, U.S. Department of Agriculture, Washington, DC.

1. In fact, the problems are remarkably similar to those historically facing farmers. Fifteen years before the Public Policy Committee's report, Lanzillotti stated, "farmers, as sellers, have found themselves at the mercy of oligopsonies, collusion, and monopsony" and noted that "leading (agricultural input and food processing) firms possess considerable market power and are included to utilize such power to manage or administer their market situation." *The more things change, the more they are the same.*
2. Contracts often specify seed varieties, inputs and other production parameters to maximize the suitability of the contracted goods for the final product. This reduces the farmer's autonomy and, at the extreme, it diminishes the role of the farmer to that of contract employee or piece worker.
3. Commodity exchanges perform this function, providing some information, e.g., summary data, opening and closing prices, historical prices, essentially as a free good, but they price other information (real time and delayed price quotes) to those customers willing to pay for time sensitive information. Private information providers such as Data Transmission Network and FarmDayta, repackage and sell public and private-sourced

information and data. Grain elevators and other merchants sometimes provide a news wire or quote service in the front office as a service to their customers.

4. For an alternative view, see Nelson and Turner.
5. Information technology is defined as the systems (hardware, software and network) that enable data and information gathering, processing, storage, discovery, retrieval and access.
6. The most vivid agricultural market example of such a system might be a 1990s version of the livestock tele-auction. Multimedia could be used to construct a virtual cattle auction, lacking, perhaps, only the olfactory node.

REFERENCES

- Lanzillotti, R.F. 1960. "The Superior Market Power of Food Processing and Agricultural Supply Firms: Its Relation to the Farm Problem." *J. Farm Econ.* 42(4): 1228-47.
- Moulton, K., and D.L. Padberg. 1976. "Mandatory Public Reporting of Market Transactions." *Marketing Alternatives for Agriculture: Is There a Better Way?* Report to the U.S. Senate Subcommittee on Agricultural Production, Marketing, and Stabilization of Prices. Washington, DC: U.S. Government Printing Office.
- Nelson, R.G., and S.C. Turner. 1995. "Experimental Examination of a Thin Market: Price Behavior in a Declining Terminal Market Revisited." *J. Agr. and App. Econ.* 27(1): 149-60.
- Office of the Vice President. 1994. *Reengineering Through Information Technology*. Report accompanying National Performance Review report, *From Red Tape to Results: Creating a Government that Works Better and Costs Less*. Washington, DC, May.
- Office of the President. 1993. *The National Information Infrastructure: Agenda For Action*. Washington, DC, Sept.
- Office of Management and Budget. 1994. *Management of Federal Information Resources*. Circular A-130. Washington, DC.
- Page, H. 1995. "Highlights of Last Meeting—Katherine R. Smith: Justifying Support for Agricultural Economic Information and Research." *The USDA Econ.* 1(7):2.
- Petzel, T.E. 1994. "Informational Needs of a Changing Food and Agricultural Sector." *Food and Agricultural Markets: The Quiet Revolution*, ed. L.P. Schertz, and L.M. Daft. Washington, DC: National Planning Association.
- Phillips, M.J. 1994. "Changes in Technologies: Opportunities and Challenges for American Agriculture." *Food and Agricultural Markets: The Quiet Revolution*, ed. L.P. Schertz, and L.M. Daft. Washington, DC: National Planning Association.
- Streeter, D.H., S.T. Sonka, and M.A. Hudson. 1991. "Information Technology, Coordination, and Competitiveness in the Food and Agricultural Sector." *Am. J. Agr. Econ.* 73(5):1465-71.
- U.S. Congress. 1995. *Agriculture, Trade, and Environment: Achieving Complementary Policies*. ENV-617. Washington,

DC: Office of Technology Assessment,
May.

U.S. Congress. 1993. *Making Government
Work: Electronic Delivery of Federal
Services*. Washington, DC: Office of
Technology Assessment, Sept.