Electronic Commerce: Effects on Electronic Markets

Rolf T. Wigand and Robert I. Benjamin
School of Information Studies
Syracuse University

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Introduction

Electronic commerce is a rapidly growing area enjoying considerable attention in conjunction with the emergence of the Information Superhighway or the building of the National Information Infrastructure (NII). Numerous firms are beginning to position themselves on this superhighway in terms of providing hardware, software, information content or services. It has also become important for other firms to hang out a shingle on the highway in the form of a home page on the World Wide Web.

Considerable changes in the economics of marketing channels, patterns of physical distribution and the structure of distributors are observable at present and others are likely to occur. This future world is well depicted in the vision of Vice President Albert Gore:

> Anyone who wants to form a business to deliver information will have the means of reaching customers. And any person who wants information will be able to choose among competing information providers, at reasonable prices. That’s what the future will look like—say, in ten to fifteen years (Gore, 1993).

The ideas and concepts presented here are based on five key assumptions:

1. Everyone and every organization will be connected.
2. The connections will be at a very high bandwidth rate, greater than a billion bits per second and sufficient to carry out interactive multi-media transactions.
3. Cheap, high-speed computation will be available to facilitate the implementation of low-cost coordination transactions.

4. A market choice box will serve as the interface between the consumer and the organization, and will provide interactive capabilities necessary to exercise free market choice in an easy and intuitive way.

5. There will be no market access favoritism.

The authors draw upon research based on previous studies focusing on transaction cost theory and electronic markets, suggesting that due to efficiencies gained intermediaries between the manufacturer and the consumer may be threatened as more and more electronic commerce manifests itself and as the NII reaches out to the consumer.

Profit margins may be substantially reduced. The consumer is likely to gain access to a broad selection of lower-priced goods.

There will be many opportunities to restrict consumers' access to the potentially vast amount of commerce.

An essential component of the evolution of this future world of electronic commerce is the market choice box. This is understood as the consumer's interface between the many electronic devices in the home such as television, cable, telephone and computer, and the information superhighway. In turn, this market choice box makes access possible to the vast variety of market choices. It appears that this device is likely to emerge as a critical technology enjoying considerable future attention in terms of public policy as it becomes an access device for consumers.

The authors examine electronic markets and the industry value chain from a transaction and transaction cost perspective. They will present a model of the NII that delineates key technology components and stakeholders. This model also allows the identification of several highly leveraged opportunities for rethinking and redefining industry value chains.

**Transaction Cost Theory**

Transaction cost theory helps us to understand how markets and hierarchies are chosen. In free market economies one can observe two basic mechanisms for coordinating the flow of materials and services through adjacent steps in the value chain: markets and hierarchies (Malone et al., 1987; Picot & Kirchner, 1987). Williamson (1981, pp. 1545-1551) classifies transactions into those that support coordination between multiple buyers and sellers, i.e., market transactions, and those supporting coordination within the firm, as well as industry value chain, i.e., hierarchy transactions.

The price a product is sold for consists of three elements: production costs, coordination costs and profit margin. Throughout the relevant literature, scholars often choose different terms to describe coordination costs; Chandler, e.g., labels them as administrative costs. The authors prefer the definition of production and coordination costs chosen by Malone et al. (1987):

Production costs include the physical or other primary processes necessary to create and distribute the goods or services being produced.

Coordination costs include the transaction (or governance) costs of all the information processing necessary to coordinate the work of people and machines that perform the primary processes. For example, coordination costs include determining the design, price, quantity, delivery schedule, and similar factors for products transferred between adjacent steps on a value chain.

Economic theory and actual market behavior assert that firms will choose transactions that
economize on coordination costs. As information technology continues its rapid cost performance improvement, firms will continue to find incentives to coordinate their activities electronically. Often, this coordination takes the form of single-source electronic sales channels (one supplier and many purchasers coordinated through hierarchical transactions) or electronic markets (Malone et al., 1987). It follows too that electronic markets are more efficient forms of coordination for certain classes of product transactions. Utilizing cheap coordinative transactions, interconnected networks and easily accessible databases, economic theory predicts that a proportional shift of economic activity from single-source sales channels to electronic markets is likely to occur, as lower coordination costs favor electronic markets. Low cost computation favors electronic markets by simplifying complex product descriptions and reducing asset specificity. An evolution from manufacturer-controlled value chains to electronic markets can be anticipated. Stakeholders will opt for markets when increased volume is greater than loss in revenue from electronic market effect.

The above four explanations can already be observed in a number of applied settings. Competing computerized reservation systems (e.g., American Airlines' SABRE CRS), certain firms within financial markets, commodity markets and various niche markets have undergone the described shifts from hierarchies to markets. Firms like Dell, Gateway and Compaq have been able to lessen personal computer product specificity and have been highly successful in selling through mail-order channels. Electronic single-source channels will evolve from separate databases within the firm, to linked databases between firms (Electronic Data Interchange), to shared databases between firms. In time electronic markets will evolve from electronic single-source sales channels to biased markets where the market maker is one of the providers. In such markets, the market maker uses the market transaction mechanisms in its favor. Next, there will be a shift to unbiased markets and finally to personalized markets where customers can use customized aids in making their choices.

**Emergence of Electronic Single-Source Sales Channels**

The emergence of electronic single-source sales channels can presently be observed within industry and is well described in the popular business press and trade journals. Little, however, is being reported with regard to the larger picture of the developments, i.e., the overall expansion of electronic markets. We would like to offer several explanations:

1. **Impact of interorganizational value chains.** Firms readily envision opportunities in electronic interorganizational value chains for improving their respective competitiveness. Thus they choose hierarchical arrangements rather than lower cost market transactions with less control of the factors noted above. In an effort to integrate supply chains electronically, buyer-supplier links such as electronic data integration transactions produce inventory and coordination savings for large purchasers and the suppliers, in turn, are forced to accommodate. Well-known examples depicting this development can be found with Wal-Mart's supply chain, as well as in the relationship with auto manufacturers and their suppliers. Single-source sales channels for travel agencies such as Rosenbluth Travel have expanded their business through agency partnerships in countries where they share a common process and database for tracking customers around the world. In this fashion Rosenbluth can provide them with the lowest prices and emergency services (Miller et al., 1993). This travel agency then is an example of the last evolutionary stage predicted for electronic single-source sales channels, a shared data base between partners.

2. **Fear of profit margin deterioration.** Firms can be expected to be very cautious about giving up their single-source sales channel profit margins, at least until a virtual market has clearly been created with enough participants to force their entry. This is especially the case when an oligopoly of relatively large firms controls a market in which each would risk sizable market share and profit margin in an electronic market. In the case of electronic markets for travel reservation systems, there is evidence that the profits of former sales channels (the airlines) are drastically reduced, while the profits of the market maker (e.g., SABRE, APOLLO) remain...
Bakos (1991) has analyzed why the electronic market effect drives profit margin from the supplier. In price-competitive markets, even a small cost of search on the buyer's part may enable sellers to maintain prices substantially above their marginal costs: in this scenario, the introduction of a market system providing price information can dramatically reduce seller profits and increase buyer welfare. According to Bakos (1991, p. 300), this effect, which is supported in economic theory, can be anticipated in undifferentiated markets such as commodity markets and is evidenced by the examples of Reuters, Quotron and Telerate, all with established markets in U. S. Government fixed-income securities, leading to a reduction in trader profits from large bond dealers.

Additional evidence is needed to demonstrate clearly the market maker effect, i.e., the phenomenon in which the consumer does very well, yet producers lose their profit margin and the market makers gain the remaining profits. This scenario suggests that producers may find it hard to generate sustainable profits without finding new strategies for product and service differentiation.

Even though such losses are widely recognized, electronic markets continue to proliferate and expand such as in financial markets, commodities and, as already noted, in the travel industry. Electronic markets have also encroached upon traditional niche markets where there are no large single-sources sales channel suppliers with high market share to protect, such as airplane spare parts.

Schwab's OneSource mutual fund market shows additional support of the market maker effect. OneSource's equity in mutual funds has grown rapidly to $10 billion in assets ("The Next Giant ....," 1994). Within the mutual fund industry, Schwab, the market maker, is perceived as threatening and growing too large and gaining control of a significant share of its operating margin. One must consider that a typical no-load fund receives a .5 percent fee for assets it manages for customers. To belong to OneSource, the fund pays Schwab half of its fee, i.e., about $0.25 for each dollar equity. Given that the largest four no-load funds currently have around $700 billion in assets under their control, movement of only the $10 billion under Schwab's current control represents a $25 million shift in operating margin to Schwab. Fidelity, the largest no-load fund, has set up for protection an equivalent market. Now no-load purchasers can buy from several smaller markets as well.

Consequently, the market maker effect may threaten the mutual fund industry's profits in the same way it did in airline reservation systems. It may require, however, competitive market makers in no-load funds to prevent market deterioration in no-load funds. Only time will tell how strong the market maker effect will be in the mutual fund industry.

A few examples that may actually be viewed as precursors of things to come will illuminate this future setting. Rapid growth in catalogue and cable shopping networks suggests that (1) there are many products meeting the criteria for electronic markets, i.e., low asset specificity and ease of description, and (2) consumers are willing to buy these products without going to a retail store. QVC, the highly successful cable television shopping channel, has been said to move goods at the rate of $39 per second by broadcasting pitches around the clock. These trends are causing retail market erosion and illustrate how electronic markets may affect consumer markets in time. Catalogue marketers such as Lands' End sell an enormous amount of merchandise. There were 10,000 mail order companies in the United States in 1992, selling $51 billion worth of goods through the catalogues (Brubach, 1993).

Until the appropriate technology opens its doors, electronic sales channels and, in turn, electronic markets will be unable to make significant inroads with the consumer. It follows that homes must be wired for interactive, high-quality video so consumers have a friendly, flexible way to access markets. These required technologies are evolving rapidly and the emerging NII is one organizer of these technologies. Current traditional retailing markets are not likely to change significantly until a critical mass of consumers will be connected via numerous channels to the evolving industry value
Industry Value Chains

It is important to explore how purchasing and selling transaction patterns are likely to change and how selling prices will be affected. Figure 1 depicts three variants of traditional value-added chains and the resulting growth in value added and selling price. It should be noted that the authors consider here only industry value chains terminating with the consumer, as opposed to intermediate goods value chains. The example used here, i.e., the purchase of a high-quality shirt, is based on actual data (Thornton, 1994) not even involving electronic sales channels. It is highly likely that actual costs savings to the consumer may even be higher than depicted here. The first chain in Figure 1 depicts the traditional chain of market hierarchies, i.e., producer, wholesaler, retailer and consumer. An alternative chain, the second chain, bypasses the wholesaler, resulting in a lower purchase price for the consumer. When appropriate information technology can reach the consumer directly, as shown in the third chain, the manufacturer can utilize the NII and leap over all intermediaries. In reality, the manufacturer is likely to retain as high a portion of the savings enjoyed by the consumer, unless, of course, market forces make this impossible.

An additional scenario is conceivable and highly likely to emerge: With the NII unfolded, the consumer could easily access a sufficient number of single-source sales channels through a market choice box or an interactive agent to search shirt manufacturers for a suitable shirt. In this setting, the market maker effect may give the consumer a minimum price, but the market maker would not have a significant transaction profit (Bakos, 1991, p. 301).

In yet another scenario, the consumer could access a set of single-source sales channels through a market choice box or an interactive agent to search shirt manufacturers for the desired shirt. In this setting, the market-maker effect may give the consumer the lowest price; in turn, though, the market-maker would not have a significant transaction profit ("Hopes and fears ...", 1994).

An Industry Value Chain Evolving within the NII

Once the consumer is interactively reconfigured, a value chain may occur, resulting in potential savings in transaction costs and potential substantial savings for the consumer. Following we present relevant NII elements and discuss several areas where companies can realize opportunities to economize along the industry value chain.
Figure 2 depicts various stakeholders and their linkages to the NII. This figure shows not only the electronic linkages, but the physical distribution chains for goods and services which are assumed to exist.

### A. Three Variants of Alternate Value Added Chains

<table>
<thead>
<tr>
<th></th>
<th>Cost per Shirt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$52.72</td>
</tr>
<tr>
<td>2.</td>
<td>$41.34</td>
</tr>
<tr>
<td>3.</td>
<td>$20.45</td>
</tr>
</tbody>
</table>

### B. Growth in Value Added and Selling Price

<table>
<thead>
<tr>
<th></th>
<th>Producer</th>
<th>Wholesaler</th>
<th>Retailer</th>
<th>Consumer*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Added</td>
<td>$20.45</td>
<td>$11.36</td>
<td>$20.91</td>
<td></td>
</tr>
<tr>
<td>Selling Price</td>
<td>$20.45</td>
<td>$31.81</td>
<td>$52.72</td>
<td>$52.72</td>
</tr>
</tbody>
</table>

* Consumer transaction costs are not considered.

**Figure 1.**

**Value Added Chains in the Shirt Industry**

Figure 2 depicts various stakeholders and their linkages to the NII. This figure shows not only the electronic linkages, but the physical distribution chains for goods and services which are assumed to exist.
The evolving information superhighway infrastructure links:

- Producers of information, including computer software, books, movies, music, etc.
- Producers of physical goods, including all manufactured goods now sold through catalogues and those in which computer technology can simplify product complexity and reduce asset specificity.
- Electronic retailers, differentiated into speciality retailers like Blockbuster or multi-product retailers like Lands' End, Sears, Macy's, etc.
- Electronic markets, expanded by market makers to include the travel and financial industries and specialty niches (e.g., shirts, personal computer software, or baseball cards).
- Physical distribution networks, simplified to move from the manufacturer to the consumer directly, or coordinated by electronic retailer or market maker transactions. The future delivery system might resemble the process that catalogue vendors use now, mostly via Federal Express or United Parcel Service. When next-day delivery is satisfactory, such companies can provide the desired service. When faster delivery is required, such as when ordering the week's groceries, variants like picking them up at the supermarket depot may emerge.
- Electronic channels, i.e., cable, telephone, cellular and electric utility industries that can provide access to the home. Although a choice of electronic channel is still limited, market dynamics are unfolding rapidly (e.g., wireless channels).
- The market choice box, where a vast amount of electronic commerce will be channeled and controlled. This is a server that manages the configuration of workstations, telephones and television sets in the home, and provides a telecommunication interface to those channels that directly reach the home (see Figure 3). The box will present a choice of markets and other activities such as entertainment, shopping, surfing the Internet, etc. It is anyone's guess how the primary graphical user interface (GUI) will be designed, although it is known that several corporations are working toward such devices. It is important not to bias the consumer to one choice over another, as the initial airline reservation system did for flight choice. Gilder (1993)
suggested that the ideal GUI may be a newspaper format, an interface designed for human interaction that has indeed passed the test of time. For example, we read a headline, skip to sports, back to the financial page, advertisements catch our attention and we study them in greater detail in order to gain more product information. The primary GUI may also be adaptable to our life styles and it is conceivable that each class of market choice may require a GUI to help explore its potential. An example of such a possible market choice box may be General Magic's Telescript user interface. Such an interface would let the consumer put an interactive agent into the Travel Store on Main Street that would purchase flight tickets and act as a pseudo-electronic market potentially by-passing APOLLO, SABRE, and the travel agents. It is reasonable to speculate that user interface owners, such as General Magic, would like to appropriate a portion of the resulting value chain and market-maker savings rather than share them with the consumer. This scenario demonstrates easily how the market choice box and standards associated with market choice (labeling of catalogue items, marketing of client/server software for products such as Telescript) can all affect the openness of information and market access.

The consumer is the wild card in this scenario. Transaction costs theory requires cost savings that satisfy both parties in the transaction. An Office of Technology Assessment (1994, pp. 30-31) study describes a consumer purchase from a transaction cost perspective:

Consider markets in the context of a consumer buying a high-end stereo system. The buyer mulls over the features that are important—wattage, audio performance, appearance, size, speakers, CD player, tape deck, and cost. There may be hundreds of dealers to choose from. The consumer reads catalogues, compares specifications, consults Consumer Reports, calls for price information, and visits dealers to compare models and prices. The search can take hours, days, or weeks. The time spent in research, comparative shopping, and making the deal are the transaction costs, as are the expense for fuel, wear and tear on the automobile ["as well as the psyche"—authors' comment],
magazine and catalogue purchases, and telephone charges.

The potential changes in the consumer's behavior as he or she takes advantage of the cost opportunities are on such a large scale, and the electronic transaction capabilities currently available so rudimentary, that our understanding of what the consumer will do is, at best, cloudy. There is some evidence that consumers will choose alternative forms of transactions (catalogue and television shopping networks) over retail store transactions, because of price, high quality, selection choice, and time savings considerations.

**Value Chains Opportunities and Risks**

One may identify four areas of opportunity and risk for stakeholders in the above described scenario:

1. **Benefits to the consumer.** The consumer will have free market access to all suppliers willing to pay an interconnection cost. The consumer will have maximum choice at lower price. If and when interactive agents are feasible, the consumer will have access to a market price without market-maker profits attached, but with the more efficient levels of market pricing from single channel suppliers.
2. **Lower coordination costs throughout the industry value chain.** Electronically linked producers and retailers will be able to lower their costs by reducing intermediary transactions and unneeded coordination because of electronic transactions directly with the consumer.
3. **Lower physical distribution costs.** Delivery costs will be minimized in two ways. Firstly, information will be transmitted electronically and much lower electronic distribution costs will be substituted. Secondly, as each element of the industry value chain is bypassed, a physical distribution link and related inventory carrying costs will be eliminated (Cf., Figure 1, value chains 2 and 3).
4. **Redistribution and potential reduction in total profits.** The lesson of the airline reservation systems, the initial behavior of Schwab's OneSource, and market economics indicate that many companies will need to face smaller profit margins. Such smaller profit margins may be compensated for by increased volume.

**Issues for the Future**

Lastly, we identify two areas that policy makers and managers need to address when considering the possibilities of the NII: freedom of market access and the potential for value chain configuration.

**Market Access**

Because of the vast volume of economic activity that will take place on the NII once fully implemented, policy makers need to set guidelines for the three areas where access may be restricted:

**The Electronic Market.** If the market maker owns or has a substantial interest in any suppliers, it can bias the market in their favor and both the consumer and other suppliers will be disadvantaged. In the airline reservation system, the airline market maker was stopped from continuing this tactic (Copeland & McKenny, 1988).

**Electronic Channels.** If the owner of a physical communication channel such as TCI, a long distance carrier, or a regional telephone operating company restricts access to any market channel because of interest in other specific market channels, it limits a consumer's free access. The potential, but dissolved, TCI-Bell Atlantic merger posed such a threat, since both own electronic channels into the home. Moreover, TCI has substantial interest in market suppliers of entertainment programming and home shopping. Thus they could have restricted access to producers, retailers, and market makers to suit their own economic interests. In addition, the channel owner, which also has a
monopoly on supplying information to the consumer, can keep access costs unnaturally high and curtail the rate of technology advancement, as when AT&T maintained a total monopoly in telecommunications.

Regardless of how many channels are connected to consumers’ homes, for the electronic market effect to occur, those channels must not limit or control access to the product or service providers wanting to reach the home.

The Market Choice Box. By design the market choice box can exhibit access to or from the consumer. It is not at all clear that the hardware processor, operating system, or other architectures that have dominated the PC evolution will maintain that status on the NII. The computing capabilities and innovation required in an operating system and user interface for interactive multimedia may result in new designs. Dominant architectures, such as IBM's in the 1960s through the early 1980s and now Intel's and Microsoft's, have demonstrated the economic benefits of ownership most clearly. However, the architectures were limited in their revenue potential to the information industry, whereas architectures that may control electronic transactions on the NII may have the ability to tap a vastly larger revenue stream of retail transactions to the consumer. Openness then becomes not only desirable but essential. However, we need to understand what openness means in terms of the market choice box.

In summary, stakeholders in the NII evolution need to think about the consequences of market constraint, and what legislative and other policies are needed to ensure a fair playing field. Moreover, stakeholders, such as consumer goods manufacturers, have as many interests in this evolution as do telecommunications and information technology companies.

Value Chain Reconfiguration

Industry value chain stakeholders must examine whether their place in the chain is threatened and, if so, what long-term strategies to experiment with. Those part of the consumer value chain need to understand under what conditions the consumer will prefer to purchase from single-source suppliers, brokered electronic markets, and intelligent agent proxies for electronic markets. In order to do so, they must learn how to use the NII in its current rudimentary form and, as its capabilities increase, begin to test their strategies more actively. They need to decide which technologies are crucial for their objectives and goals, and follow their progress closely. Lastly, they need to follow electronic market implementation carefully to learn how the market-maker effect will redistribute profit margins.

References


Fun facts and figures from the Internet Index. (1993, December 30). *Boston Globe*.


