DRIVEN TO SHOP? THE ROLE OF TRANSPORTATION IN FUTURE HOME SHOPPING

Jane Gould

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Jane Gould is a Research Fellow, Centre for Marketing at London Business School.

London Business School, Regent's Park, London NW1 4SA, U.K.
Tel: +44 171 262-5050  Fax: +44 171 724-7875
JGOULD@lbs.lon.ac.uk  http://www.lbs.lon.ac.uk

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Abstract

Driven to Shop? The Role of Transportation in Future Home Shopping

This study explores how growth of electronic home shopping will change transportation needs. In today's retail markets, most goods are shipped and people physically travel to stores. These travel activities are likely to change with electronic home shopping. A new class of products are emerging, like music CDs and software, that require no physical distribution, i.e. digital distribution. The majority of products sold through electronic shopping will still require transportation, however. Today, the personal automobile is essential, since stores are often located at a distance, and consumers bear the cost of bringing their purchases home. The willingness of consumers to pay for home-delivery, the logistics for providing it, and its perceived convenience and time-savings may be key to the development of home shopping. This study also discusses how telecommunications may lead to more efficient delivery systems. New types of retail markets may also emerge, based on using telecommunications to establish a market that brings buyers and sellers together, and provides information in lieu of the movement of physical goods. In these electronic markets, the shipping of goods takes place only after telecommunications are used to facilitate a sale. New telecommunication-intensive markets are also emerging in the sale of "perishable" goods. These goods, like last minute-airline or concert tickets, require little physical distribution. However, the final product may generate entirely new trips and travel activity. Finally, it is suggested that electronic home shopping and its travel related activities will depend on the growth and use of other teleservices from the home.
Introduction:

Shopping has traditionally required buyers and sellers to be in the same place. The movement of stores into a comparatively small number of very large outlets on the edge of town has increased the distance which most shoppers travel. Electronic home shopping could counter this trend, if new electronic markets develop and consumers substitute network based transactions or trips in their cars. This might provide a societal benefit from fewer personal vehicle trips and less sprawling shopping center development. On the other hand, shopping from home also could lead to increased personal isolation, higher theft rates, and new noise and emissions from suburban delivery vans.

Over the past fifteen years there have been many highly publicized failures of electronic home shopping (Talarzyk and Widing, 1994). However, there is a renewed spate of interest due to factors like the recent growth of the Internet, improvements in the speed and quality of video graphics, and confidence in the security of digital transactions.

While new improvements in the electronic infrastructure for home shopping are taking place there has been little recent discussion in the transportation literature of home shopping. A foundation, which precedes the current wave of popular interest, is provided by Salomon (1985), Salomon and Koppelman (1988) and Koppelman, Salomon and Proussaloglou (1991).

In this paper we explore the reciprocal relationship between home shopping and transportation. The demand for future electronic shopping depends upon the resolution of many transportation issues, like the convenience and cost of home delivery. Demand for trips outside the home may also change because of the growth of electronic shopping. In this research we discuss transportation-related trends occurring in electronic shopping, including:

(1) *Traditional delivery systems will have much higher demand:* Although some goods will be delivered electronically, the majority of purchases are material and require delivery to the home. The future of many teleservices, and particularly teleshopping, depends upon vehicular delivery. Yet, over the past 80 years, there has been a pronounced decline in delivery of home groceries and other staples, and an offsetting increase in the use of personal vehicles. What is the likelihood for future home delivery?

(2) *A new electronic delivery systems is emerging:* A new class of ‘information products’ can be delivered to the home electronically. The content of products like games, books, and software can be transferred digitally using high-speed broadband networks. An increased demand for digitally transmitted goods would appear to
‘reduce’, or at least change, physical trips to buy and bring home these products/services.

Relatedly, a new market form is emerging based upon the efficiencies of moving information, instead of people or goods. These information markets substantially transform when, where, and whether physical goods are moved.

(3) Advances in telecommunications will bring operational efficiencies and help traditional retailers provide home shopping services.

Our investigation of the first two issues is enlightened by the framework of Salomon and Koppelman (1988). They suggest that ‘shopping’ is not a single activity, like purchasing a good. Shopping is a series of interrelated stages, including entry into the market, choice among shopping modes, information gathering, evaluation of information, and product selection. It has both in-store and non-store components. They indicate that shopping fulfills two main functions: it provides an economic function in which the consumer expends time and money to learn about products to reduce the risk or increase the utility of a planned purchase. Secondly, shopping is undertaken because of its psychological benefits.

Citing Manski and Salomon, they describe the demand for telecommunications as a “derived demand based on information that is located elsewhere.” If the quality and quantity of information is deemed useful, consumers might substitute home shopping for travel trips. However, because people enjoy some types of travel, and they shop for other than economic purposes, electronic home shopping could also generate additional travel and new types of in-store shopping activity.

1. Home Shopping: Definition and Evolution

We begin with a working definition of electronic home shopping. Electronic home shopping is an inquiry or transaction for consumer goods or services that takes place through an interactive media with video capability. The inclusion of the terms video and interactive is made to distinguish electronic home shopping from services provided today over broadcast television, and through catalogue/phone sales. Future electronic shopping is likely to take place over broadband communications networks, and it will be accessed through either computers, television sets, or a hybrid of both. The technology is likely to offer new features, like a greatly expanded universe of offerings, intelligent agents that can screen choices, and memory of past ‘shopping’ transactions. Electronic home shopping will usually take place outside a retail store, but does not have to occur at home. Interactive kiosks in airports, libraries, or bus depots and computer terminals at work also provide opportunities to shop.
Home shopping can be thought of as an electronic continuum, with computers and interactive television at one end, and door to door sales at the other. In the middle are telephone/catalogue sales, which are both electronic and interactive, but offer no video capability. (Figure I) With the exception of door to door sales, all home shopping lacks the sensory dimensions of touch and smell.

| door to door sales | catalogue/phone | CD-ROM/ broadcast TV | broadband data network (e.g. Internet) |

Figure I: Home Shopping as an Electronic Continuum

Shopping at home, as distinct from home shopping, may have been one of the earliest forms of commerce. It preceded the traditional market, where both buyers and sellers traveled, usually on a designated date and place, to trade. The print catalog, which existed from the 1850’s onward, may have been the first instance where the buyer could be geographically remote from the seller. This form of shopping was honed by Richard Sears, but its implementation depended upon the telegraph and railroad (Tedlow, 1996). Home shopping received another boost in the 1920’s, from the growth of home telephones. However, diffusion of the telephone coincided with the growth of car ownership, and the latter became the preferred mode for initiating shopping in the US.1

It is interesting to compare the rise of catalogue and telephone sales between the US and Great Britain. In the former, geographic distances were vast, and catalogues provided an opportunity to sell to geographically remote populations. When mobility was provided, though the car, catalogue sales and telephone ordering began to decline. In Great Britain, geographic distances were not as vast, and the catalogue developed as a means of letting credit to poorer populations, instead of as a substitute for travel. Ordering by telephone also flourished in Great Britain, because it offered home delivery to shoppers that did not have cars.

In the past twenty years, there has been tremendous speculation that electronic home shopping will grow. Although current sales are negligible, there are forecasts that by 2003, there will be a $4 to $5 billion market in the US, equivalent to about 1/3 of the 1992 market for mail and telephone sales (Smith Shi and Salesky, 1994). Some frequently cited reasons for expected growth in electronic home shopping are the convenience and time savings it would provide to consumers. Although time savings are cited based on comparisons of in-store and electronic shopping, they often overlook travel-related activity. Consumers often combine shopping trips with other activities, and may gain efficiencies from bundling separate tasks together. For
example, a shopping trip to the mall may also include a stop at the post office, the ATM machine, and the dry-cleaner.

2. Home Shopping, Delivery, and the Personal Vehicle

In this section we discuss the role of the personal vehicle for shopping trips, and explore new issues arising from a demand for home delivery. These are inter-related issues for if electronic home shopping grows, there should be a net decrease in the use of personal vehicles for shopping trips, and a net increase in the number of trips undertaken by commercial delivery services. This depiction is oversimplified since households may value mobility, as an end in itself.

2.1 Personal Vehicles and Convenience

The personal vehicle plays a pivotal role in the future of home shopping. In the United States, it is estimated that about 19% of all person trips in the US are made currently for shopping (this includes mass transit), and it represents 12% of the annual vehicles miles traveled, or VMT (USDOT, 1994). (In 1977 they accounted for 10% of the motor vehicle miles in the U.S.- Salomon, 1985). Shopping trips are chained with other out-of-home travel, making the estimation of miles complex. Actual VMT is likely to be higher, because people tend to under-report trips for searching or ‘window shopping’ that did not result in a transaction.

The household vehicle secures the cost of shopping, in terms of both travel time and travel expense, upon the consumer. Each entry into the market generates at least four costs: the cost of the item, the cost of time to search for the item, the time to travel, and the expense of travel. Figure I depicts a typical grocery shopping trip, in terms of travel and non-travel activities. This figure is adapted from a study of the European food industry and its potential to offer home delivery of groceries in the future. (Coopers and Lybrand, 1996). It can be seen that the travel related portion of shopping is relatively limited in terms of the steps, but it does consume about 30% of the total shopping time, when time to load and unload the vehicle is factored in. This analysis treats grocery shopping as a stand-alone activity rather than as one combined with other types of travel.
The demand for electronic shopping may depend, in part, upon whether consumers wish to trade-off travel time, and shopping time for electronic transactions. There are at least two transportation issues, which are distinct from whether the consumer perceives electronic shopping to be an acceptable substitute for shopping in stores: one is whether electronic shopping leads to savings of time that would have otherwise been spent in travel, and the other is whether the ‘travel to shop’ activity has intrinsic value.

It is difficult to estimate whether electronic home shopping will produce time savings. Although travel time is reduced by home shopping, current forms of electronic shopping do not account for the offsetting time spent waiting for home delivery. Currently, electronic shopping takes considerable time if a complete on-line session is counted from the time that a machine is turned on, connected to a broadband network, item selection takes place, and billing and delivery specifications are made. With advances in electronic shopping technology, the speed of service will increase, but it will still remain a factor.

It is untested whether consumers desire to reduce the amount of time they travel to shop. This will vary by accessibility to stores, whether other trips are chained
(combined) with shopping, and by personal characteristics like age. External factors will also determine how shopping trips are perceived, like the ease of parking and the level of congestion. There is little research to gauge how people feel about the time they spend traveling, and for shopping in particular.

As Salomon and Koppelman (1988) have noted it is likely that people enjoy some aspects of routine travel. Studies indicate that people do not always prefer the most efficient route (Wachs, 1965). There may be an underlying human need for mobility, and it is not clear that the ability to eliminate physical travel through communications will substitute for this human desire for physical travel. In fact, this need might accelerate with adoption of other teleactivities, like telework. Baer (1985) depicts one possible scenario for the future, where the computerized home could become an electronic isolation chamber. Under such circumstances, home-bound populations might choose to travel, and shopping related trips might increase in distance or frequency. Shopping serves many roles, including social contact Tauber (1972), Forman and Srivam (1991).

In U.S. retailing, there has been a movement to locate large warehouse stores, and factory outlets at a great distance from urban centers, and people appear to willingly travel to them. The recreational side of these trips has not been investigated, but tour bus operators organize day-trips to these shopping centers, and some families seem to make journeys that combine this distant shopping with sightseeing. An earlier study predicted the frequency of shopping at a distance from home, and found it was associated with higher income and holding out-of-town charge cards. (Hermann and Beik, 1968).

As cars have made it more feasible to shop at greater distances there has, conversely, been a growth in ‘convenience’ stores, particularly in the United States. Chain stores like Circle K and 7-11 provide higher prices, and a more limited stock, but presumably greater convenience, and time savings.

There is a literature in marketing on people who shop using catalogs. Catalog shopping, which represents about 4% of all retail sales in both the United States and the UK (EIU, 1995) is sometimes viewed as a precursor of electronic shopping, and it is studied for clues. There is little evidence that catalog shoppers currently choose this medium because they have reduced mobility or access to transportation. The travel substitution theme can be found in older studies (Peters and Ford, 1972) Gillette (1970) but more recent work seems to be motivated by the search for time-busy customers. Working women do order from mail-order catalogs more frequently (Lumpkin and Hawes, 1985), but marital status, shopping for children’s clothing, and income are stronger predictors. In qualitative research it is found that catalog users tend to be careful shoppers, and they cite benefit from having a wider selection of merchandise choices. There is very little research that examines the shopping habits of populations that are spatially remote from market centers, but it would be interesting to observe catalogue use among those who live in extreme snow-
belts or on remote islands, as well as among those with physical handicaps that limit outside transportation.

2.2 Home Delivery

In the 1880s, James Bellamy, a science fiction writer, imagined an urban infrastructure with instant home delivery. Bellamy depicted home delivery through a network of pneumatic tubes, which linked together, and sped purchases from wholesalers to cities, and from cities to households. Bellamy’s forecast was not outlandish, since London had 67 ‘intranets’ - postal offices connected by pneumatic tubes (Connected, 1996).

With recent advances in electronic communications, home delivery is branching into two separate and distinct functions. One function, akin to Bellamy’s pneumatic tubes, consists of delivering information in electronic formats, for products like CDs, newspapers, and books. Emergent products include subscriptions to software downloaded through cable to PCs, interactive on-line games (EIU, Oct. 1995), and printing-on-demand for low volume, out-of-print books.

There is, of course, a home delivery industry today based on delivering items ordered from catalogues, by direct mail, or telephone. However, the majority of goods are brought from consumers from stores, back to their homes. In a few cases, a retail store will arrange for transportation of goods after the consumer has made a face-to-face purchase. Consumers are unable or unwilling to transport the goods themselves, perhaps because they took mass transit, their vehicle is too small, or the purchase is too heavy. Bulky appliances and furniture are frequently delivered after the consumer has transacted for them. Another, less frequent form of home delivery, is regular, scheduled delivery of perishables like milk. Diaper delivery is a special and interesting case of home delivery, since it is a transaction of both a service and a product.

Over the past 80 years home delivery has decreased, as consumers used their own vehicles, or mass transit, to reach stores. In Figure III, for example, we track the decline in the home delivery of milk in Britain, over a ten year period. The percentage of households taking home delivery declined by 20%, and continues to fall. (Baker, 1992).
The decline in door-to-door delivery of milk is occurring for a number of different reasons, including a price gap between the milkman and supermarket, and a spiral of falling share and reductions in quality of service. Thus, the experience of this industry cannot be generalized. However, a movement ‘back’ to home-delivery could present a number of similar issues.

The accessibility of consumers at home to receive deliveries is an intractable problem, at least in the short run. The initial market for home shopping is believed to be busy, middle-income families, because they would pay a premium for this service. Ironically, because they work more hours, they are also less available to receive home deliveries. In the United States, the absence of at-home neighbors to accept deliveries, and increases in crime are additional factors that have deterred home delivery.

Programs have been made to expedite home delivery, and some derive from improvements in telecommunications, like consumer initiated checks of parcel location, and en-route, mobile phone calls to waiting households. More radical ideas to improve home delivery propose retrofitting the exterior of homes with large, secure delivery receptacles and refrigerated cubicles (McNair and May, 1978). A centralized post-office box is another variation of ‘home’ delivery. Shoppers would collect their pre-packed groceries and packages at the office or from neighborhood centers, or local stores. Most hybrid collection points are still likely to rely upon use of the car, since shoppers need to carry their packages or bags home. Transportation issues associated with the use of pick-up centers have not been addressed; for example, the availability and ease of driving to them and securing a parking place, the time savings if other shopping or household activities initiate separate trips, and the pollution generated by shorter vehicle trips from the home.

Delivery systems will grow in importance with expansion of electronic home-shopping. Jones and Salomon (1993) caution that it will generate new trips, with
unknown characteristics. New transportation attracted to the home for deliveries could bring uncontrolled congestion and pollution into suburban areas.

Improvements in transportation logistics could make home delivery more feasible, and in the next section we consider them separately.

3: Changes in Retailing Structure and Organization

Firms that have managed the distribution system well have often had a competitive advantage. For example, in the past century, cattle were shipped live on rail - this was highly inefficient because only about 40% of the animal was edible, and large numbers of them died en route. Gustavus Swift realized the advantage of refrigerated rail cars for meat carcasses since live cattle would not have to be shipped (Tedlow, 1996). This change in distribution fundamentally changed the market.

From the point of view of efficiency, some might argue that the current form of retailing, with stores, is as inefficient as the shipping of live cows. Retail stores serve as a ‘waystation’ for goods; goods are shipped from warehouses, put on display, and then transported again by consumers. The stage of ‘putting things on display’ enables consumers to see choices, make comparisons, and ultimately select goods. Information which is provided by text, by pictures, or through moving video and sound can substitute for ‘putting things on display’. Catalog and mail-order businesses provide this capability today, and eliminate one trip length, since goods move directly from a warehouse to the consumer.

It has been suggested that efficiencies in home delivery might be achieved if retail stores developed purpose-built warehouses for home distribution. It is estimated that about 20% of a clothing retailer’s costs come from the overhead and maintenance of store fronts (see, for example, Benjamin and Wigand, 1995). Figure IV is based on an analysis which examined the chain of providing goods to consumers. Fewer steps in the chain from manufacturer to consumer, and presumably fewer separate transportation links, reduce the final cost of goods.
The retailing industry today will face a great challenge, if consumers use information channels to learn about product categories, and find that the cost of ordering goods on-line is less expensive. Although retail stores will not become obsolete, there may be a need for fewer of them if electronic sites gain in popularity and number. Some retail stores have investigated offering dual operations; both electronic home delivery, and in-store shopping. This is often not feasible because a separate order-filling capability and purpose-built warehouse provide efficiencies for competing in home-delivery. For example, a recent analysis of the food industry found that using current grocery stores was the most cost-ineffective mode for electronic grocery shopping. In comparison with other modes, like automated warehouses, use of the existing retail structure was very costly (Coopers and Lybrand, 1996). The higher cost can be attributed to (1) the logistics of shipping the grocery items twice, and (2) labor costs from processing orders manually.

In a few industries, notably computer hardware, some companies have abandoned in-store retail sales, and market completely through remote order/remote delivery systems. Like the catalogue industry, most of them consign their deliveries to third parties or postal authorities.²

There is an explicit transportation cost to the growth of remote warehouse centers since they tend to be located further away from cities, and they increase the number of frequent deliveries. However, improvements in fleet logistics are being used to make these long distance shipments more efficient. Today, many shippers have sophisticated communication systems set up with retailers to deliver store merchandise (see, for example, Hoover, Tyreman, et al, 1996). Similar system might be developed for home deliveries. Shippers use information systems to consolidate loads, choose routes that minimize travel time and congestion, and coordinate intra-fleet locations.
For a discussion of the impact of telecommunications on the supply of transportation, see Mokhtarian, 1990.

4: New Digital Markets

In the previous section we discussed how efficiencies in logistics and transportation might reduce the number of retail outlets, or lead to different configurations for moving merchandise to consumers. In this section, we examine the growth of digital markets. These markets have less reliance on physical distribution since the product is often distributed electronically. If physical distribution is required, it takes place as the last step in a series of transactions and exchanges.

A second reason for the growth of digital markets has to do with consumer search-time and effort. In the past, either the time associated with travel, the cost associated with travel, or both factors discouraged certain transactions. For example, consumer to consumer sales through classified advertising involved a number of 'wasteful' trips to screen choices and gather information. These trips were 'wasteful' because they did not always culminate in a purchase, and they took time to transact. A physical trip was undertaken because the telephone was not sufficient to provide the quality or quantity of information to screen the item. Today, this type of travel can be reduced as more descriptive information is accessed by video, sound, and text over broadband networks. The availability of this information, and its low cost, may enable new markets to develop because transversing time or space becomes more 'frictionless'.

To illustrate this, we begin with an example where telecommunications is being used to establish a market, and provide buyers and sellers with information, instead of physical inventory. Auctions, for example, have typically been travel-intensive, since (1) the buyer and (2) the seller, and (3) the goods they exchanged, were transported in advance of the sale. Today, a growing number of digitally based auctions are taking place. One of the earliest auctions developed in Japan, where business to business used car auctions are held on-line. Sellers call in with a list of vehicles they are offering. An inspector takes a picture of these cars and gathers other information. Information about the cars replaces travel to inspect the cars in-person and the cars themselves are never transported until a sale is arranged. (Rayport and Sviokla, 1994). Growth of electronic, on-line markets may spur 'just in time' delivery, analogous to the earlier development of 'just in time' manufacturing, to secure arrival of components and supplies for manufacturing.

A different and separate emergent market is growing for electronic auctions that vend perishable 'information' products. In a traditional (outdoor) market, vendors reduced in price produce that would spoil at the end of the day. In electronic markets, perishable items are increasingly being sold like airlines and travel, or ticket-bookings for sports and concerts. These products are 'perishable' because they expire in time, and electronic formats provide a new format for disposing of them quickly, as their monetary value declines. Rapid information is a key ingredient of these products, since
their value changes with time, and the volume of sales. In the past, this type of market was small or non-existent, because the consumer had to incur many costs: initial travel, waiting time, the uncertainty of supply, and finally, if a transaction occurred, the need to exercise the activity on the spot (e.g. a trip with standby fares). These particular digital markets are based on disposing of items that decline in value over time, but other markets might develop based on items that increase in value over time, particularly if the certainty (the absence of risk) is a factor.

A third type of digital market is expanding because the goods themselves require no physical distribution, and the process for selling the goods actually appears to improve with digital capability. In the past, it has been difficult to provide product demonstrations or samples of electronic products, like games or music CDs, but these are more easily offered over broadband distribution networks. Electronic storage also provides the ‘stock-keeping’ of a larger inventory than in traditional retail stores, and may reduce the selling price (or increase the gross margin) because of lower costs for duplication, packaging, and distribution.3

Finally, an entirely new market entry is developing that combines properties of physical distribution markets with digital ones. It is becoming increasingly possible to provide manufactured goods, like clothing and housewares, that are made-to-measure. The manufacturing process is flexible so that individual product specifications and customization can be accommodated at relatively low cost. As this new market grows, the physical inventory in stores could change and consist mainly of generic samples used to guide the placement of customized orders. Or, consumers might place these orders directly on-line, from their home. In either case, a product will be generated that requires physical delivery from the manufacturer to the home.

The diversity of new electronic markets is shown in Figure V. Although traditional shopping forms, like the physical shopping mall will continue, new forms will also develop, and in particular consumer to consumer transactions. This diagram, from Sheth and Sisodia (1993) also illustrates the development of a business to business ‘bazaar’- in the past, these markets were transportation intensive and hard to form, but they can now be facilitated through online business-to business exchanges.
Up to this point we have considered the future role of electronic markets where a product is sold, and we have distinguished that product according to its digital or material properties. A large portion of shopping activity involves a search for information- that search may be purposive with a specific product in mind (e.g. a new car), or the search may be more general, to learn about market trends and changes (e.g. what are the ‘97 cars like?). Increasingly product information and advise is becoming available electronically, and households with access to a broadband network can browse this information without initiating physical trips. Access to electronic information may provide different information than a physical trip but it may prove very useful to consumers. (e.g. best car prices and current advise from rating services versus ‘kicking the tires’). Increasingly consumers may use information intelligence, like intelligent agents, to search product specifications and cost. The effect of this online information gathering on travel trips is unknown- on the one hand, it might reduce the number of ‘window-shopping’ visits, but it could also lead to a net increase in travel if the awareness, selection, and variety of choices are increased.

5. Observations and Summary

Over the past 150 years, changes in both transportation technologies and information technologies transformed commerce by bringing new ways to move together people, goods, and information. We are on the brink of change as information technology performs many of the traditional functions of transportation, like moving goods over geographical distances, bringing buyers and sellers together (electronically) to form a market, and providing detailed information about goods.

During this century, home delivery declined, despite available technologies like the telephone and an automated postal system. Electronic home shopping is likely to reverse this trend, and will increase the number of trips to the home for delivery and put demand on the speed, the quality, and the reliability of third-party shippers. Organizational efficiencies from telecommunications may help to make home delivery more cost-effective.

While a future household will ‘attract’ delivery vehicles, households might still choose to make the same number of outside trips, or even increase their number. Shopping provides a number of recreational and social benefits. More available parking at stores or less congestion, might encourage new in-store visits. However exogenous factors like, a long-term increase in the cost of travel - say from increased petroleum prices - might change the balance towards more in-home activity.
Other studies in transportation have clearly established that in-home and out-of-home activities are linked. The same broadband technologies that enable electronic home shopping are likely to enable video conferencing and other services that would be valuable to teleworkers. The interrelationship between electronic home shopping and other tele-activities should be explored. On the one hand, teleworking provides the opportunity for daytime deliveries, and teleworkers might find the social aspect of home delivery to be pleasant. However, teleworkers might also find it more useful or recreational to shop in-person at local stores.

On a small scale, some in-home/out-home tradeoffs are taking place today, and it would be valuable to study their trip generation consequences: these include phone banking, as a substitute for travel to both ATM machine and bank branches, use of Pay TV in lieu of video store rentals, and ‘ordering’ sports or cultural shows over cable TV instead of outings to the live event.

Another important development that will change travel behavior is the emergence of electronic products and electronic markets. A new class of consumer goods, like CDs and software require no physical transportation. Moreover, the purchase of these goods can coincide, in time, with the transaction. This area should be studied in terms of both trip generation and trip substitution. The development of electronic auctions and electronic markets are also unexplored in terms of their travel dynamics. Perhaps the most important development in terms of travel related change will be the opportunity for consumers to perform new and additional information-gathering activities online without incurring the need to travel from their home or office.

Finally, the linking of transportation with telecommunications for purchases is likely to produce a number of unanticipated results. Reminiscent of old-fashioned home delivery, items that are consumed on a predictable schedule (laundry detergent, diapers, milk) might trigger orders that are automatically sent out on a fixed schedule. However, the information for this delivery might be linked to other sources, like the days of the week that a member of the household teleworks or the inclusion of product samples based on ads or infomercials targeted to this household. Deliveries to the home, which are automated by information, and contains both information and goods, may become increasingly common. In the absence of Bellamy’s pneumatic tubes that connect individual homes, most electronic home shopping will still culminate with travel generated delivery, and most people may still choose to take outside trips.

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1 This is not to underplay the importance of the telephone ordering (telesales) industry. The telephone is also widely used to locate information for shopping (see O’Keefe and Sulanowski, 1995). An old Yellow Pages campaign suggests a direct telcom/transport tradeoff, “let your fingers do the walking...”
A few mail catalogue firms, like Great Universal Stores (GUS) in the UK, are vertically integrated into shipping and distribution. GUS owns White Arrow delivery, one of the largest large goods delivery services in Europe.

Microsoft predicts that 10% of its software will be sold electronically over the next 18 months, and market forecasts are that 50% of all computer software will be sold (and delivered) electronically by the year 2000.

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