INFORMATION TECHNOLOGY IN MARKETING

INTRODUCTION

Marketing management may be defined as the "process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives" [1]. This definition conveys a sense of the activities associated with marketing. From a broader viewpoint, Drucker [2] notes, "Marketing is so basic that it cannot be viewed as a separate function. It is the whole business seen from the point of view of its final result, that is, from the customer's point of view." In this sense, marketing represents a perspective that affects all functions of the organization. In recent years the rapid advances in computer and information systems have influenced not only the activities associated with marketing management but are also accelerating the adoption of the broader perspective of the role of marketing in an organization.

Consider how K-Mart, the well-known retailer, is using computer systems to integrate its market measurement, inventory and purchase management, and marketing [3]. The familiar microcomputer-based Point-of-Sale (POS) systems at the check-out counter handle all cash register functions including credit authorization. Every time a store clerk scans an item's Universal Product Code (UPC), the information on the price look-up file (e.g., regular price, promotion price, etc.) is sent to the register for processing. This file at an individual store can be accessed and modified by headquarters, on an as-needed basis, through a satellite link. The company is now installing a centralized replenishment system that will gather sales information on a daily basis from the POS systems through a satellite network connecting its 2,200 stores. The replenishment system maintains inventory on 150,000-200,000 items. This system determines the requirements of items in each store and places an order electronically with a vendor and/or the distribution center. Eventually, the satellite network could also be used to transmit digitized information from an imaging system in order to send merchandising plans, new apparel designs, etc., between various K-Mart production and distribution units. The substantial investment in computers and information technologies helps K-Mart to design and alter its marketing mix, products, promotion, pricing, and distribution, rapidly under changing market conditions. The company expects this system to increase its market share through timely merchandising, improve gross margins by maintaining in-stock positions on fast-selling items, and improve inventory turnover by suitably managing the merchandising mix. By using information technology to better anticipate and serve the needs of its targeted segments, the company is acquiring a major marketing advantage, that may be sustainable due to the scale of its operations.

As another example, Frito-Lay has invested more than $45 million in developing an information system for its truck route sales representatives who deliver the company's products to 400,000 locations. All 10,000 delivery people have laptop computers that can communicate with a central computer at the company's headquarters. The system cuts down on paper work, reduces costs, and improves service. The company estimates that the system
saves about 30,000 hours a week and considerably reduces postage and forms costs. More importantly, the data generated by the salesforce helps track the sales of 100 branded products in 250 sizes [4]. The data are fed into a system that helps the company manage production, monitor sales, and guide promotional strategy [5]. The company is now setting up decision support systems to exploit this rich source of data to help its executives to make important strategic decisions.

Although several other examples of the successful use of automation in marketing and sales have been documented [6], computers have permeated the marketing function to a lesser extent than the production or accounting function. In large companies, some operational tasks of the marketing department, such as payroll, have been computerized for quite some time. However, these tasks had more to do with “bookkeeping” activities associated with marketing, rather than with marketing tasks per se. In some instances, specific marketing tasks such as “media planning,” or statistical analyses of marketing research data were accomplished on an as-needed basis by time-sharing on mainframes.

The greater acceptance and use of microcomputers by marketing managers has created major opportunities for computerizing new areas of marketing and for linking marketing to the other functions of the organization. This change is simply a reflection of a larger trend toward end-user computing in all major functional areas of business, including marketing. Moriarty and Swartz [6] point out that further computerization of engineering and manufacturing will lead to proportionately smaller productivity gains than computerization of many activities still performed manually in the sales and marketing functions. A report in The Wall Street Journal (June 29, 1989) quotes a study by the Yankee Group that marketing and sales functions will account for 25% of the total expenditures on computers in the next few years. This is expected to yield gains of 15–20% in productivity.

Installation of hardware has grown hand-in-hand with the exploding growth in software to support the performance of various marketing tasks. A recent survey lists over 500 different PC-based software programs for marketing and sales [7]. These software programs support a wide variety of functions such as sales analysis and support (approximately 190 of those listed), media and advertising (25), direct marketing (42), marketing research (105), marketing planning (43), pricing (4), product management (16), and sales forecasting (18).

While many related areas of computer and information technology are beginning to be widely employed in marketing, this article focuses on assessing the impact of microcomputers (PCs) within the larger context of changes in information technologies (IT). The primary objective is to provide the reader with an appreciation of the actual and potential benefits of using PCs in the performance of various marketing functions.

A CONCEPTUAL FRAMEWORK

Conceptually, computerization of marketing functions tends to result in an evolutionary sequence of three basic benefits:

1. Improved efficiency: Initially, the firm deploys automation systems for improving the efficiency of existing marketing tasks by making them faster and/or cheaper. The tasks automated are often clearly identified (e.g., writing sales letters to prospects, retail credit authorization) and resulting benefits (cost savings, faster processing, etc.) more precisely measured.

2. Higher effectiveness: Once there is an installed base of computers, software, and trained personnel, the firm uses these resources to improve marketing decision
making, which helps accomplish broader but less precisely measurable goals such as enhancing responsiveness to consumers or deploying marketing resources more precisely (e.g., deployment of sales force effort to more profitable accounts).

3. While the two benefits above are important in justifying installation of expensive computers and supporting technologies, it is becoming clear that the primary benefit of computerization is the competitive position that it provides to the company. When fully integrated into the marketing function, PC and IT become central components in the strategic posture of the company. For many companies, improvements in efficiency and effectiveness are often necessary for simply maintaining parity in the marketplace. In other instances, leading companies are using IT to create a position of marketing advantage, often extending to a few years, by using the systems to generate enduring "invisible" assets such as loyal consumers and dealers who are "locked-in" to doing business with the company instead of with competitors. In addition to analyzing the efficiency and effectiveness gains from IT, shrewd managers are exploring the competitive rationale for improving the efficiency and effectiveness of various marketing tasks.

To illustrate these benefits, we once again consider the use of Point-of-Sale (POS) systems installed by supermarkets and retailers. The set of benefits resulting from the introduction of this technology is summarized in Figure 1. Initially, microcomputers were installed on a standalone basis in supermarkets either to speed up existing activities such as keeping track of sales of each stock-keeping unit (SKU) and for price look-up, or to provide new services such as check cashing and credit authorization. When the PC is supplemented by laser-based scanning equipment and UPCs on products, the transaction time, on average, is two minutes faster and register time is three to four times faster than with manual keying. [9]

Soon, other benefits of these POS systems became evident. In fact, these systems evolved quickly into "information systems" for the retail outlet. The information gathered by the system began to be utilized to more effectively manage the store's resources through better control and management of inventory, improvements in internal control of operations with faster and more accurate information, better handling of peak season sales, better payroll and commission management, etc. A further benefit of the system is the additional revenues realized by selling the data collected from POS systems to manufacturers and marketing research firms.

Over time, the systems have evolved into a network of POS units connected to a central computer, thus becoming integral to the very core of the supermarket business, especially in larger chain stores. Improvements in efficiency and effectiveness that accrued to the pioneering firms are being replicated by competitors who install similar systems, realize the same benefits, and bring the situation back to parity. The initial gains in efficiency and effectiveness become strategic necessities [10] to survive in the marketplace. As a result, the pioneering firms now must look for ways to further enhance the benefits from these

* This does not happen automatically. In fact, the meshing of the technical aspects of the information systems with the social aspects of the organization is viewed as a primary factor for long-term success of business automation systems [8].
Efficiency

- Improving check-out speed
- Price look-up
- Credit authorization
- Generating a bill for the customer

Effectiveness

- Better control and management of inventory
- Better handling of peak season sales
- Improving internal control

FIGURE 1. Illustrative benefit matrix for retail management.

systems and obtain a second level of competitive advantage that cannot be easily replicated by competitors, at least in the short run.

In Figure 1, the column under competitive advantage shows how some of the leading retailers are currently using POS systems. Adaptive pricing enables them to make quick changes to prices to reflect competitive conditions. Price changes that used to take two weeks can now be accomplished in a day. Likewise, Electronic Data Interchange (EDI) allows supermarkets to exchange data (e.g., price lists and product descriptions) and establish computerized links with suppliers to improve order processing. Electronic communication helps K-Mart to reduce order costs from $1.10 to .17 per order [77], thereby helping it to price products competitively. To further solidify their relationships with consumers, some supermarket chains have implemented, on a test basis, computerized "frequent buyer programs" to automatically keep track of consumer purchases and provide rewards based on total purchases at the store.

By careful monitoring of sales of various items under various promotion and advertising conditions, some stores are able to put together an assortment of items and merchandise to fit optimally with their target segments. This helps develop "store-loyalty" and "lock-in" the consumers. Sophisticated supermarket chains are beginning to use information from these integrated IT systems (PCs + Scanners + Telecommunications + Central computer) to reduce transaction costs for their suppliers (food brokers and manufacturers of grocery
items) and to negotiate better terms, thereby further strengthening their competitive position.

We examine through examples how various marketing systems, from simple automation systems to complex integrated systems, enable companies to improve their efficiency, effectiveness, and competitive position. We conclude by highlighting some future trends.

**MARKETING EFFICIENCY**

The value of new technology is more easily perceived and verified in areas where it is used to relieve humans of tedious, repetitive, or time-consuming tasks. Technological solutions often help increase the efficiency in the performance of these tasks. Marketing is no exception. Thus, for example, there has been great interest in recent years in the installation of sales automation systems that relieve salespeople of routine nonselling tasks such as report generation and other administrative chores. Typically, salespeople spend about 25% of their time in nonselling activities when, presumably, most would like to spend all of their time on selling tasks such as prospecting and qualifying potential customers, approaching the prospects, arranging presentations and demonstrations, closing the sale, and follow-up.

PC-based sales automation systems have been developed to support field salespeople. Many pharmaceutical firms now equip their salesforce with laptop computers. For example, Sandoz Pharmaceuticals Corp. is implementing a centralized sales automation system that can be accessed and used by its 1,000 field salespeople using laptop computers [12]. These systems help automate nonselling tasks such as report generation, information access, maintenance of client lists, order entry, price look-up, etc., thereby freeing up time for selling activities. Preliminary results from the Sandoz system indicate that salespeople using the system are able to make one additional call on physicians every two days compared with those who do not yet use the system. As another example, the system installed by Sonesta International Corp. to help its reps sell meeting and convention services saved the reps three to four days of work per month on paperwork [13].

Other PC-based systems help reduce selling costs. The cost of a face-to-face sales call continues to escalate. The average cost per call was estimated to be $240 in 1988 [14] and it takes, on average about four calls to close a sale [15]. To cope with the rising costs, companies are increasingly using telemarketing to identify leads, to provide low-cost sales support such as appointment settings, and in some cases, also to close the sale. This helps salespeople to focus their efforts on the more important prospects and sales tasks. Currently, telemarketing systems perform tasks such as auto-dialing and script prompting.

Another area that promises improved efficiency is consumer information and ordering systems. Some banks, for example, provide a service which allows consumers access to their account information through a touch-tone telephone. Other companies are trying out various ordering systems that improve efficiency in filling orders. Arby's Inc. is testing a system in which customers have the option of placing their order by touching a color screen. Preliminary results indicate a 10–20% increase in sales per man-hour and a reduction in service time of 20–30 seconds per order (The Wall Street Journal, June 14, 1989). Likewise, Florsheim Shoe Co. has successfully installed a computer-video ordering system in its outlets, enabling customers to place orders or nonstock/out-of-stock items directly with the factory or shipment within a couple of days.

Efficiency increases are being realized in many other areas of marketing that are too numerous to be listed here. Whenever consumers make airline reservations, request stock quotes, use an automatic teller machine, or order a catalog product over the telephone, they
are the beneficiaries of the efficiency gains made possible by the automation of some marketing tasks.

**MARKETING EFFECTIVENESS**

In the early stages of computerization of marketing tasks, increasing the efficiency of repetitive tasks was important to justify investment in IT. Today, improved efficiency no longer is viewed as the key criterion for marketing automation. It is almost a fait accompli. More important but less precisely measurable benefits accrue from computerization that provide relevant information and supporting tools that improve the quality and consistency of marketing decisions. In turn, improved decisions enhance the effectiveness in the performance of marketing tasks.

**Support Marketing Decision Making**

Nowhere, perhaps, is the impact on marketing decision-making more evident than in target marketing using large geographic databases and specialized mailing lists. Target marketing enables companies to use different marketing programs on different consumer segments in a cost-effective manner. This is a consequence of the revolution in spatial data analysis and logistics management triggered by computers. Until about 10 years ago, most mass marketers used a common marketing program (e.g., identical prices, similar advertising appeals, etc.) across all regions of the country. They also often failed to focus on subtle but important differences between various segments buying their products (e.g., different regions of the U.S.). By using a technique known as “geodemography,” companies have now segmented the U.S. market into many smaller markets. Claritas Corp.’s Prizm system permits them to slice the U.S. into 240,000 clusters of about 340 households each [16]. Background information such as average age, education levels, and income helps to characterize and describe each cluster. From a marketing perspective, this classification enables firms to selectively deploy marketing effort and increase the effectiveness of their marketing programs. For example, Days Inn Corp. decided to use direct mail in selected clusters instead of relying on mass media TV advertising to reach their target group of households in the $25,000–$45,000 income range [16].

Targeted clusters along with the corresponding mailing lists may be condensed onto files that fit on diskettes or compact disc-read-only memory (CD-ROM) for access on a PC for further processing. Marketing managers can purchase these mailing lists, load them on a PC, create a letter, and send a copy of the letter with enclosures to everyone on the mailing list. Almost any desired slice of the demographic database may be purchased from numerous vendors and customized for various marketing applications such as sales territory alignment [17] and site selection for retail location. Even greater levels of microsegmentation and targeting are likely in the future. This will make it possible for a company to be both a cost leader and at the same time to provide differentiated marketing programs to different market segments.

Another way in which PCs are helping to make better marketing decisions is by helping managers to understand and use the vast amount of market information that is available in some industries. Advances in electronic data-gathering technologies combined with enhancements in database management systems have greatly increased the quantity, quality, and timeliness of marketing information. For manufacturers of packaged goods the concept of “single-source data” is close to a reality. Single-source databases contain information not
only on what the consumer purchased at the store, but is also linked to associated information about TV advertisements the consumer may have been exposed to, coupons that the consumer may have received, and the particular store environment (e.g., store prices, special displays, and promotions) in which the consumer made the purchases. As suggested by Little [18], these databases shift the focus of information systems from status reporting (e.g., What were our sales last month?) toward response reporting (Did our advertising help increase sales of our product last week?; Does a 20¢ coupon result in more profits than an end-of-aisle display?).

Brand managers use PC systems to analyze and interpret marketing data for decision making regarding the appropriate mix of advertising, promotions, retail displays, and coupon offers. With each share point translating into millions of dollars in sales, an edge in data use is very important. Decision support software such as PC-EXPRESS (a product of Information Resources-Javelin Products Group) and METAPHOR (a product of Metaphor Computer Systems) are helping marketing research specialists and brand managers access and use large marketing databases in making marketing decisions.

The use of decision support for brand management is illustrated by the following example of Clorox's introduction of Kingsford mesquite charcoal [19]. Before national launch, the company was interested in determining if mesquite sales would cannibalize sales of two other brands the company was promoting. Sales data collected from within the company and by outside vendors in test areas were then analyzed on workstations supported by the Metaphor system. Analyses indicated that sales of the two other brands declined only slightly in areas where mesquite was sold. Further analyses of the sales of competing brands indicated that generic charcoal brands marketed by several large supermarket chains were declining. Therefore, Clorox's share of the market rose by several share points. Bolstered by these analyses, the company introduced a successful national brand. Other examples of the use of marketing databases for brand management decisions are discussed in Abraham and Lodish [20].

Computers are also enhancing marketing decision support in many other areas that are too numerous to be included here in a comprehensive manner. The following are some highlights of the application areas:

Product management: Shelf-space management systems such as Apollo, occuSPACE, and MarketWare [7] help store managers to configure their shelf space with categories and brands that provide optimal profitability and increase traffic flow. Other systems for new product development support decisions such as generation and selection of brand names, and planning and scheduling of large new product development projects.

Sales management: There are also considerable improvements in sales force effectiveness from the sales systems discussed earlier. The information flow from salespeople on a regular basis provides a mechanism for sales managers to deploy, motivate, and compensate their sales forces much more effectively than was possible in the past. For example, many sales force systems help managers to (1) forecast sales in each territory, (2) target the sales effort on the most promising accounts and prospects, (3) improve the quality of each sales call by better call planning and scheduling, and (4) focus their training effort on the poorer performers. Improved communication and information flow can also help the salespeople. For example, salespeople from a firm's diverse divisions who operate in the same territory can exchange valuable information.

Pricing management: We are not aware of many systems for supporting pricing decisions. Most existing PC systems tend to focus on supporting relatively narrow domains such as generating customized quotes (e.g., home insurance) or analyzing leasing and bidding
options. Airlines and hotels are beginning to use yield management systems to determine optimal allocation of seats/rooms to various price categories in order to maximize revenues.

Advertising and promotion management: Various systems aid managers to decide on the benefit to use in the ad, plan and evaluate alternative media options, design promotions, and even plan and manage a major sales seminar or publicity event [7].

Primary Data Collection
Another significant impact that PCs have had on marketing decision making is by improving the quality of data gathered directly from consumers in marketing research studies. PCs are widely employed in telephone interviewing. In addition to saving costly interviewer time, these systems help gather more accurate information [21]. Branching options based on consumer responses make these systems more flexible. Computers allow data to be collected directly from consumers without the aid of an interviewer. Responding directly to computers still offers some novelty which can instill some interest into a boring task. Also, computers are perceived to be nonjudgmental and, as a consequence, consumers are more willing to offer sensitive information. Data collection directly from consumers for marketing models such as Conjoint Analysis are greatly simplified by using PCs [22].

Aiding Consumer Decision Making
Some companies use PCs to help consumers in their purchase decisions. A subsidiary of Weyerhauser has developed an interactive workstation called DesignCenter that helps consumers design a home deck [23]. In addition to helping consumers to visualize alternative deck configurations, the system also prints out a bill of materials for the chosen deck. A leading Japanese company is developing a system to help supermarket shoppers plan alternative meal menus by considering factors such as the nutritional content, preferences for various types of meat, number of people sharing the meal, etc. Some cosmetic surgeons are using computer graphics to help consumers visualize the potential change to their appearance before deciding to undergo the surgery.

COMPETITIVE POSITION
Of all the benefits of computerization, none is more critical than its role in improving the competitive position of the company. Few leading companies can survive today without automating and providing computer support for their marketing functions. Imagine the likelihood of success of an airline with a manual reservation system or a large supermarket with manual retail checkout. Such companies are likely to go out of business because they are unable to match the competitors' costs, quality, speed, and convenience of delivering products and services. Clemons [24] uses the term beneficial strategic necessity to refer to this situation. However, while middle-level managers focus on improved efficiency and effectiveness of operations as criteria for marketing automation, senior management is recognizing that the raison d'être for marketing automation today is improved competitive position. Thus, computerization of marketing is increasingly being driven by strategic planning rather than by operations planning.

In every industry, leading companies are investing heavily in strategic information systems. Some companies are thought to have realized enormous pioneering benefits from such systems [25,26]. While much has been written recently about the many competitive advantages of IT, Clemons [24] argues convincingly that sustainable competitive advantage...
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from IT is rare because it is difficult to protect innovation in this field. Further, it is impractical to "hide" applications from competitors in customer-oriented areas such as marketing. Competitive advantage does not result from IT alone. As Clemons [24] suggests, it is only when IT adds value to resources not available to competitors that it provides a sustainable competitive advantage. Nevertheless, some past successes suggest two necessary conditions under which strategic information systems can provide a marketing advantage:

- **Enhancing loyalty of consumers and channel intermediaries**: Marketing automation systems simplify the transactions between the company and its various publics. By reducing transaction costs for the company and its suppliers and customers, IT enables the company not only to differentiate its products (e.g., better and quicker service), but also offer lower prices. This often increases the "switching costs" for the customers, thereby ensuring their continued relationship with the company.

- **Increasing competitive barriers**: The huge transaction-specific assets required for developing integrated marketing information systems increase the fixed costs of operation and improve competitive strength by erecting entry barriers in the industry. Like K-Mart discussed in the introductory section, leading firms in every industry are beginning to use marketing automation to build a competitive advantage.

American Hospital Supply Corporation (AHSC) has used information technology to solidify its relationship with customers† and, in a sense, "locking-in" or electronically "hand-cuffing" its customers. The company supplies thousands of items such as syringes and surgical gowns that hospitals need. An 800-bed hospital may generate 50,000 purchase orders per year at an estimated preparation cost of $25 to $30 each. To increase the efficiency of order processing, AHSC developed, ASAP, an order entry system, which allowed hospitals to directly log into the AHSC system using terminals. Hospitals could check the price, stock status of items, status of back orders, delivery times, as well as place an order for selected items. By 1984, ASAP permitted direct transmission of purchase orders from IBM-PCs at hospitals (or from other input devices such as bar-code scanners) to AHSC's mainframe computers. Although ASAP was initially developed to improve the accuracy and speed of AHSC's internal management of orders, it also enabled its customers to automate their own order processing. This soon gave AHSC a competitive edge in obtaining orders from hospitals. Competitive barriers include not only the costs of developing a comparable system, but also a great reluctance among users to learn new systems. Thus, "switching costs" often protect the pioneers in information technology. The average order on AHSC's computer-based system was 5.8 items compared with the industry average of 2.7.

As this example shows, computerized ordering systems can "capture" the consumers by significantly reducing the costs of doing business for the customers and increasing the cost of switching to another supplier. Like American Hospital Supply Corporation, many pioneers have developed and installed "strategic systems" [27]. American Airlines developed the SABRE system to simplify the tasks of travel agencies in making airline reserva-

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*Assets that cannot be easily redeployed for other purposes.
†Some information for this section has been taken from Harvard Business School Case No. 9–186–005.
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Using the system, the travel agent can make virtually any reservation on airlines, hotels, and car rentals around the world through easy access to flight schedules, fares, etc. In addition to delivering high value to the intermediaries (travel agents), the system has benefitted American Airlines in other significant ways. Airlines that could not afford to develop their own systems, pay a fee to have their flights listed on SABRE and pay an additional fee for reservations made on their flights through the system. Another important marketing benefit of SABRE was the introduction of the Frequent Flyer Program which could be implemented with relative ease compared with airlines that did not have a comparable system. More recently, the company introduced the EASY SABRE system to enable consumers to directly access and use the system for checking fares and making reservations without having to go through a travel agent.

Another successful system, closer to marketing, is Economost developed by McKesson Corporation. Since the system was introduced in 1975, the company has turned a lackluster drugstore distribution business into a major success. The system enables the independent drugstore owner to reorder supplies using handheld computers. The computer also helps the owner/manager to easily compute item profitability, keep tabs on prescription drug use by customers, bill insurers for medicines [29], and even map an efficient route through the store to fill an order. Now, more than 99% of McKesson’s order flow arrives electronically [24] resulting in substantial savings in processing and handling costs. In turn, the company passed on much of the savings from the system to its customers through lower prices and volume discounts, thereby endearing themselves to their customers. Economost enabled independent drugstores to realize some of the same cost advantages enjoyed by large chains, giving them a better competitive edge. This preserved the market served by McKesson [29].

None of these systems was initiated or inspired by carefully designed strategic goals. Rather, they evolved from operational considerations such as shortage of order clerks or escalating ordering and servicing costs. However, these companies were among the first to recognize the strategic significance of their systems. Today, the potential competitive benefits of marketing systems are beginning to be understood by the less innovative firms. Some highlights of other major competitive benefits are described in the following paragraphs.

Service Augmentation and Differentiation

Many commodity products can be augmented with information-intensive services to make them more unique. For example, Federal Express’s integrated system enables it to track a consumer’s package anywhere in the system. While few consumers actually request this service, the fact that it is available reassures consumers and helps the company distinguish itself nontrivially from other competitors by enhancing its image for reliability.

Automobile manufacturers can enhance the value of their car by providing computerized maps of the entire country that can be accessed easily inside the car. A similar, although simpler, product is the one offered by Hertz Corp. which provides its auto rental customers with computerized directions to hotels, dining establishments, and other points of interest through an interactive video system. Other ways to enhance services include offering a toll-free telephone for providing answers to consumer questions. American Express customer service representatives can answer a wide range of travel-related questions over the telephone because they have ready access to a wide array of information from their desktop computers. Honeywell representatives can provide tips for thermostat installation over the telephone.
Building Channel Power

By developing an integrated IT-based system, the company can position itself centrally with respect to the information flows in a marketing channel. Being the source of information, the company creates dependence among the channel members toward use of products and services offered by the company [30]. Traditionally, large companies such as Procter and Gamble Co. have been the source of important information about market conditions and merchandising strategies for supermarkets. Consequently, they wielded considerable power over retailers. However, the availability of store-level scanner data is gradually shifting relative power in the channel from manufacturers to retailers.

Creating New Products

Merrill Lynch has developed one of the most successful financial products using IT. Their patented Cash Management Account (CMA) system combines information on a customer’s checking, savings, credit card, and securities accounts in one computerized monthly statement. The account also automatically puts idle cash into higher interest (compared to savings banks) money market funds. This product could not have been developed without several enabling computer and information technologies. Although many other competitors have successfully replicated CMA, this product continues to dominate the market because of its “first-mover” advantage. It is difficult to switch satisfied customers from the CMA account. Further, the number of potential clients, who come from higher income households, is limited.

Creating New Markets and Distribution Options

Computer systems have generated entirely new market segments for familiar products. For example, First Boston, Inc. has developed a system to directly match mortgage borrowers, whose financial qualifications and needs are typed into the system, with lenders [25]. Once a match is made, the system automates much of the processing by, for example, printing out letters requesting credit reports. In a much broader setting, the Compuserv network and the new Prodigy system from Sears bring together buyers and sellers electronically. Likewise, new distribution options such as automatic tellers, shopping at home, and computerized buying and selling of stocks have all increased the flexibility of companies to provide products and services. Currently, home shopping seems to provide more benefits to the companies than to the customers. However, with increasing penetration of home computers, and simplified software for access and use, electronic shopping may yet become a success.

Cross-selling

McGraw Hill developed a system that links its magazines, books, newsletters, economic forecasting, and financial data operations. This system helps reps to sell a wider range of products to customers and satisfy customer needs better. Cross-selling also helps link departments within the company that previously had little or no communication with each other.

Minimizing the Disadvantages of Being Large

Many smaller companies (e.g., Dr. Pepper soft drinks) have prospered in the past by catering to niche markets. However, with IT, large companies are able to cost-effectively microtune their marketing programs to niche markets. There is a real danger that smaller companies that lack computer system facilities to improve efficiency and effectiveness of operations will be driven out of the market.
The foregoing discussion of competitive positioning through information technologies may be conceptualized as shown in Figure 2. Using several examples from retailing, the figure highlights the notion that marketing advantage increases as the contents of the system and its requirements become knowledge-intensive and outputs of the system support strategic decision making.

The rationale for the figure follows from the argument summarized well by Clemons [24] that it is only when IT adds value to resources not available to competitors that it provides a sustainable advantage. When used for strategic decision making, the systems focus management attention on identifying and managing the company's *competitively advantaged resources*, which may be defined as resources that are relatively less transparent to, or less replicable by, competitors. Likewise, as the contents become more knowledge intensive, the system will include more company-specific and proprietary techniques that will facilitate more effective deployment of competitively advantaged resources.

Along the first dimension, marketing advantage increases as the focus of the systems moves from data orientation to knowledge orientation. Knowledge-intensive systems contain specialized knowledge that help transform information into actionable decision options. For example, an automatic inventory replenishment system replaces manual activities such as counting of items, sending out purchase orders, etc., associated with inventory management. However, to do this well in a competitive environment, the system not only needs...
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data about sales of various items from the stores, but also information about various suppli-
ers and their past performance, and proprietary knowledge about the criteria to be used in
deciding how much to order. Likewise, raw retail scanner data alone are not of much value
for decision making without further processing. Today, many retailers are inundated with
100 to 1,000 times more bits of data than they had access to just a few years ago. Continuous
human monitoring of these data is tedious; further, the sheer volume of data (especially in
larger chains) makes it likely that important and timely information might not be used for
decision making. To get around this problem, researchers are exploring the use of expert
systems based on artificial intelligence (AI) techniques for monitoring the data and alerting
decision makers to key events, and problems that require their attention and decisions
[31,32].

Along the second dimension, marketing advantage increases as the systems are en-
larged from supporting and controlling specific activities to supporting and enhancing stra-
tegic decision making. Store information systems often help perform/monitor relatively
routine activities such as compiling reports of daily sales of each item or helping identify
items in short supply. On the other hand, shelf-space management systems help manage
interrelated activities of decisions. We refer to this as managing a process. Good use of
shelf-space requires decisions on where to place items in the store and how much space to
allocate to each item based on the profit per linear foot. Finally, store management systems
are decision-intensive and help resolve broader tactical and strategic issues such as which
items should be carried by the store, which items should be promoted jointly, and what type
of promotion (e.g., inserts in newspapers, coupon drops, end-of-aisle displays) should be
used for a particular item. These decisions help the store compete more effectively.

FUTURE TRENDS

The preceding paragraphs have outlined some of the ways in which marketing tasks are
being computerized. This trend is likely to continue in the future, perhaps with modified
goals and with different hardware and software configurations. In this section, we describe
some new and innovative ways in which PCs and IT are likely to be deployed in marketing
in the immediate future:

Shifting Emphasis from Information to Information Use

For too long, the goal of IT employed in marketing has been to provide decision makers with
data and information. Today, managers also need knowledge, available at the point of deci-
sion making, to help them better use all the information to which they have access. Knowl-
edge-based systems using AI techniques are likely to be employed to help marketing
managers use information more effectively for making marketing decisions [33]. Some sys-
tems are already being implemented.

The Sling Expert [34] helps industrial salespeople by making recommendations for
the right sling to use in lifting various types of loads. Unlike information systems that are
only capable of listing products satisfying various criteria already available in a database,
this system first understands the problem that the user is trying to solve by asking a series of
questions. It then makes recommendations not only on the type of sling to use, but also pro-
vides part numbers along with several alternatives. Most importantly, it can explain its rec-
ommendations. The expertise of industrial salespeople can be vastly expanded by making
available numerous knowledge-based systems that apply specialized knowledge at the
point of decision making. Another system that is operational is the Authorizer’s Assistant at
American Express which helps users determine whether a particular applicant is creditworthy [35]. These knowledge-based systems are transforming inside salespeople from order takers into order getters.

Another intriguing possibility is the development of remote diagnostic capabilities in familiar equipment such as copiers and elevators. Knowledge-based systems may be embedded in such equipment to continuously monitor their performance. Xerox is experimenting with a system that continuously monitors copy quality and other aspects of the copier’s performance (personal communication from Mr. Uyetani of Fuji-Xerox, Tokyo, Japan). The copier is accessed overnight by a central computer which can alert field service staff to potential problems. Eventually, using AI techniques, the PC could also offer suggestions on what might have gone wrong and what parts should be brought by the service person. This ability to provide preventive service on equipment whose downtime is expensive can provide important competitive advantages.

The major hurdles in the development of AI systems continue to be the enormous costs of development, the lack of standards, and a general unfamiliarity with AI techniques. However, several experimental systems in marketing [36] show promise for further development and deployment.

**Networks**

As more computers are networked, business relationships are being revolutionized. The marketing department can now more easily interact with many departments of the company with which it has had only a nodding relationship. For example, marketing, design, and engineering departments can communicate more quickly and effectively in developing new products or in servicing major equipment. Likewise, companies, customers, and dealers can more readily deal with each other and this is creating alternate channels that could only have been visualized a few years ago. For example, consumers can send their queries about software to software manufacturers such as Microsoft directly on the Compuserv network and receive an electronic reply. Alternatively, they may post their queries on electronic bulletin boards where other consumers on the network may be able to provide a suitable response. In summary, by aiding direct links between “downstream” marketing activities and “upstream” R&D and production activities, networks can greatly enhance organizational response to changing market conditions.

By enabling international links, networks further shrink the global marketplace. Many companies such as Citibank have already established networks that link all their international operations. Soon, individual consumers may also be able to tap into global networks to complete transactions such as getting loans or ordering hard-to-get books and magazines from publishers in another country.

The major hurdle or networking and electronic data interchange has been the lack of uniform standards. There is a gradual move toward common standards in recent years. Problems associated with security breach and the threat of computer viruses are also inhibiting wider use of networks.

**Systems for Store 2000**

In the retailing area, new systems such as electronic shelf tags and marketing workbench have been proposed to enhance local store profitability and to get closer to the retail customers [37]. The purpose of these technologies is to run retail stores in an even more information-intensive manner than described earlier. Information collected at the store will be combined with information from outside vendors as well as with information on other stores.
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in the chain in order to provide a continuous look at how the store is performing and what changes need to be made.

Another view of the future is provided by Information Resources, Inc. which is trying to use the conventional shopping cart in grocery store to display Point-Of-Sale and other information to the consumers as they wheel their shopping carts around. Grocery products are influenced more by POS tactics such as end-of-aisle displays, store coupons, and features than by non-POS tactics such as TV advertising or manufacturers' coupons. Currently, manufacturers have little direct influence on the consumers at the point of purchase. All this may change with the use of the videocart. Ads are received through a satellite dish located on the roof of the supermarket, stored in the manager's PC, and then transmitted via low-power FM transmitter to each Videocart's memory [38]. With this technology, a specific message, for example for Folger's decaffeinated coffee, might be beamed just as the consumer is in the aisle where coffee is sold. In addition, the videocart is expected to provide a wealth of information such as the time spent by consumers in various aisles in the store.

There are many other innovative and interesting systems being developed in marketing. We hope that the systems that we have singled out here convey the great potential for further deployment of computer and information technologies in marketing.

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