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# Marketing Information Systems in the Fortune 500 Companies: Past, Present, and Future

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ABSTRACT: Soon after the concept of a management information system was introduced in the mid-1960s, marketers tailored it to their own unique needs, naming it the marketing information system (MKIS). Several studies have been conducted of how MKISs are used in the *Fortune 500* companies, and the authors compare their current findings to those of ten and eighteen years ago. It seems that both the MKIS support and the model use for the three levels of marketing management are more balanced today than ten years ago. Moreover, pricing decisions instead of product decisions are taking the lead in using the MKIS services today. Marketers have been taking advantage of developments in technology and methodology to increase the level of decision support since 1960s. However, there is a lack of satisfaction with the MKIS among the

marketers today. Many firms are not linking their marketing plans with their company-wide information system plans to create competitive advantages. Under today's intense global competition, these situations must be rectified as soon as possible. Otherwise, they will definitely create pressures that could either increase the role of the marketing information system in these firms, or eliminate it entirely.

**KEY WORDS AND PHRASES:** marketing information systems, marketing functions, marketing activities, computer usage, decision support systems.

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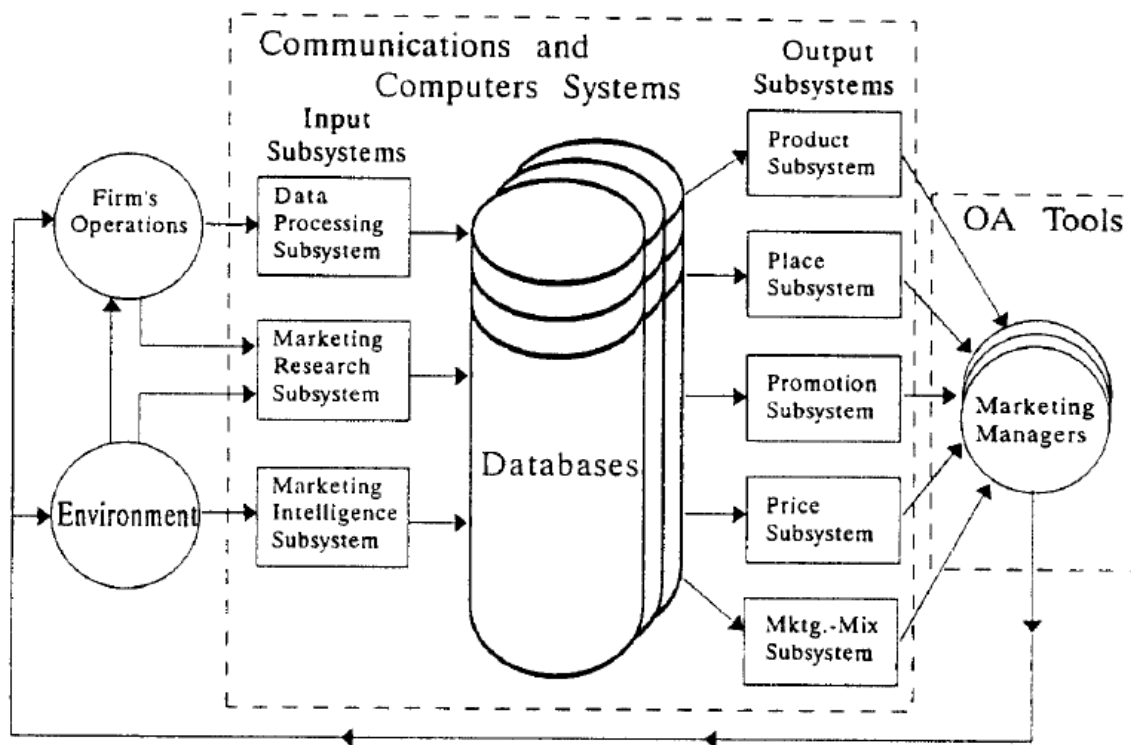
THE FIRST DECADE OF COMPUTER use in business was characterized by emphasis on data processing applications such as payroll and inventory. However, by the mid-1960s, computer scientists realized that a large group of potential users of computer output had been virtually ignored. These were the firms' managers, and the scientists responded by conceiving the notion of computer-based systems designed specifically to meet the managers' information needs. The systems were collectively named the *management information system* (MIS). The response by the managers was immediate, enthusiastic, and widespread, especially in the large firms such as the *Fortune 500*, where most of the data processing problems had been solved.

For some reason that is still unclear, marketing academicians chose to specially tailor the MIS concept to the marketing function of the firm. These efforts were labeled the *marketing information system* (MKIS). By 1970, the structure of such systems had been documented in the literature from various perspectives [4, 8, 23, 33]. But as the marketers increased their interest level, a strange thing happened. The rest of the functional areas became disenchanted with the information system concept, primarily because of difficulties encountered in implementing it, and a new application, called the *decision support system* (DSS), captured the attention of managers and computer scientists alike. Although there are several distinctions between the MIS and DSS concepts, a key feature of the DSS has been its aim at information needs of specific managers rather than entire organizational units or subunits. Perhaps because of this more specific focus, the DSS concept escaped the criticisms that had marked the early MIS efforts, and has endured as the primary computer-based application for management support during the 1970s and 1980s.

The marketers followed the other functional areas in jumping on the DSS bandwagon, but never gave up on the idea of an information system dedicated to their own needs. The MKIS continues to receive attention from academicians, computer scientists, and marketing managers in spite of attention being directed at other, more recent applications such as artificial intelligence and office automation. Will this interest persist? One approach to answering this question is to trace the trends that have characterized the MKIS as it evolved, identify the current and expected influences on computer use in the firm, and project whether the trends are strong enough to withstand the influences. Several previous studies [3, 18, 29, 30] have followed this approach to project the trends in the 1970s and 1980s. Following these studies, the authors set out to survey the use of MKIS in *Fortune 500* firms. The results from this study along with those from the previous studies [3, 29] provide a basis for projecting the future of MKIS in the 1990s.

## THE MKIS FRAMEWORK

THE MKIS HAS NEVER BEEN INTENDED TO OPERATE in a stand-alone manner. Even if marketers favored such an approach, it would not be feasible because of the symbiotic relationship that exists between the data flows and processes of the firm's functional areas—marketing, manufacturing, finance, and human resources. Marketing must integrate its data with that from the other areas, and vice versa. Rather than existing as a separate *physical* system, the MKIS is simply a way of thinking about the solution of the information needs of marketing managers. It recognizes that marketing managers have certain unique needs, and specifies how those needs can be met. Thus, the MKIS is a *conceptual* system. This conceptual system can be viewed in a variety of ways. Kotler [23], Montgomery and Urban [33], and Crissy and Mossman [9] recognized its decision-support capabilities, whereas King and Cleland [21] saw it as a way to engage in strategic planning. Brien and Stafford described how it could be used in developing marketing programs [4]. All of these descriptions envisioned the MKIS as an information processor, gathering data and information from the marketing environment, processing that data and information, and providing the results to marketing managers in the form of management information. The managers would act on the information and make decisions that affect the environment as well as the firm's operations [31]. The MKIS is therefore a closed-loop system with the information processor and marketing managers serving as the control mechanism.



**Figure 1. Framework of a Marketing Information System**

Figure 1 illustrates this framework. Input subsystems (data processing, marketing research, and marketing intelligence) gather data from both the environment and the firm's operations and enter them into the databases. On the other hand, output subsystems (product, place, promotion, price, and marketing-mix) process the data available on the databases to produce the desired

information for the marketing managers. While four of these subsystems provide information about the four corresponding marketing ingredients—the *Four P's*: product, place, price, and promotion, the marketing-mix subsystem enables a marketing manager to develop strategies that consider the combined effects of the four ingredients. This entire MKIS is supported by various types of hardware and software for computing and communications purposes. The marketing managers may further use the available office automation (OA) tools (e.g. electronic mail, computer conferencing, video conferencing, etc.) to communicate with each other to make decisions. This MKIS framework along with those of McLeod and Rogers [29, 30] were used to design the questionnaire for this study.

## **Research Methodology**

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### **Subjects**

THE SUBJECTS OF THIS STUDY WERE THE MARKETING EXECUTIVES of the top 500 firms listed in the April 1990 issue of *Fortune* magazine. This population was selected because it usually provides a leadership in the use of information technology. Furthermore, the population has been surveyed by two previous studies [3, 29] which allow us to compare their results with those from this study.

### **Questionnaire**

This study is to examine the attitudes of marketing executives in *Fortune* 500 firms toward their marketing information systems (MKIS). To facilitate the comparison and the projection of the MKISs, the questionnaire developed by McLeod and Rogers [29, 30] was adapted. Furthermore, based on the aforementioned MKIS framework, six additional questionnaire items reflecting a firm's usage of information technology were included:

1. Does the firm have a company-wide computer information system (CIS)? If yes, is there a formal written CIS plan? If yes, is the CIS plan integrated with the marketing plans?
2. Does the firm have a formal, written marketing plan?
3. Is the firm using any telecommunication technology, such as electronic mail, computer conferencing, video conferencing, etc.?
4. What types of computer hardware is being used for the MKIS?
5. What types of computer software is being used for the MKIS?
6. Is the marketing executive satisfied with the firm's MKIS?
7. Does the firm's CIS or MKIS create any competitive advantage?

Through a series of reformatting and rewording, the final questionnaire containing four pages was sent twice to each of these executives in 1990.

### **Respondents' Profile**

One hundred and thirty-two (132) marketing executives returned the survey questionnaires giving a rather high response rate of 26.4 percent. These respondents exhibited the demographic

characteristics of the *Fortune 500* companies. Of the 132 respondents, 96 (73%) are from product-related companies and 36 (27%) are from service-related ones. Among them, 99 (75%) indicated their firms have some form of MKIS. Table 1 shows the distribution of the types of companies. In terms of company size, the annual sales and the number of employees of the companies are both identified. Table 2 shows that the sales of the companies are all over 500 million dollars and the numbers of employees are all over 1,000 persons. Since the firms that constitute the *Fortune 500* are relatively homogeneous and the response rate was very high (26.4%), the results of this study should be representative of the *Fortune 500* firms.

**Table 1. Industry Types of Respondents' Companies**

Type of industry	Company has MKIS?		Percent of row total
	No	Yes	
<i>Product-related non-manufacturing industries:</i>			
Metal mining	0	2	1.5
Coal mining	0	2	1.5
Oil & gas Extraction	0	3	2.3
Mining & quarrying of nonmetallic minerals (except fuels)	0	1	0.8
Subtotal:	0	8	6.1
<i>Product-related manufacturing industries:</i>			
Food & kindred products	3	10	9.8
Textile mill products	0	1	0.8
Furniture & fixtures	0	2	1.5
Paper & allied products	1	4	3.8
Printing, publishing & allied industries	1	2	2.3
Chemicals & allied products	1	8	6.8
Petroleum refining & related industries	1	3	3.0
Rubber & miscellaneous plastic products	1	1	1.5
Stone, clay, glass, & concrete products	1	3	3.0
Primary metal industries	3	4	5.3
Fabricated metal products, except machinery & transportation equipment	1	5	4.5
Industrial & commercial machinery & computer equipment	4	6	7.6
Electronic & electrical equipment & components except for computers	2	6	6.1
Transportation equipment	4	4	6.1
Measuring, analyzing & controlling instruments	2	3	3.8
Miscellaneous manufacturing industries	1	0	0.8
Subtotal:	26	62	66.7
<i>Service-related industries:</i>			
Motor freight transportation & warehousing	0	2	1.5
Electric, gas & sanitary services	1	9	7.6
Wholesale trade—durable goods	0	1	0.8

Wholesale trade—nondurable goods	0	1	0.8
General merchandise stores	0	1	0.8
Food stores	0	1	0.8
Miscellaneous retail	0	1	0.8
Depository institutions	0	3	2.3
Insurance carriers	2	5	5.3
Insurance agents, brokers & service	0	1	0.8
Holding & other investment offices	1	2	2.3
Personal services	1	0	0.8
Business services (including EDP)	1	1	1.5
Motion pictures	1	0	0.8
Health services	0	1	0.8
Subtotal:	7	29	27.3
(N = 132) Total:	33	99	100.0

**Table 2. Size of Respondents' Companies**

Size of Company	Company has MKIS?		Row total	Percent of row total
	No	Yes		
<i>Annual sales:</i>				
\$ 500 million to below \$ 1 billion	17	40	57	43.2
\$ 1 billion and more	16	59	75	56.8
Column Total:	33	99	132	100.0
Percent of column total:	25.0	75.0	100.0	
<i>Number of employees:</i>				
1,001 to 5,000	10	34	44	34.1
5,001 to 10,000	9	24	33	25.6
10,001 to 25,000	4	22	26	20.1
25,001 to 50,000	3	14	17	13.2
50,001 to 100,000	4	5	9	7.0
Column total:	30	99	129	100.0
Percent of column total:	23.3	76.7	100.0	

## Results and Discussion

ALTHOUGH 132 FIRMS HAVE RETURNED THE QUESTIONNAIRES, only 99 firms indicated they have some forms of MKIS. The responses from the 99 firms were analyzed and compared with those of the two similar earlier surveys on *Fortune 500* firms, one in 1972 [3] and the other in 1980 [29]. It should be noted that the following discussion only reflects the status of MKISs in these large firms. Smaller firms may have a different status since they would have less available information resources than the *Fortune 500*'s.

The results of this survey revealed that 35 of the 95 managers (37%) who answered the question regarding the MKIS framework view their MKISs as the data gathering and information producing system illustrated in Figure 1. Eighteen managers (19%) see their MKISs as systems intended to help the manager answer key questions, 16 managers (17%) regard their systems as data banks and model banks, and 12 managers (13%) see their systems as primarily helping in the development of marketing programs. Note that the percentages cited herein are computed based on the number of respondents who answered the specific questions, rather than the total number of respondents, because all respondents did not answer all questions in all cases.

### **Data Gathering Input Subsystems**

Fifty-seven (58%) managers identified the firm's data processing subsystem which provides internal accounting data as the most important source of data and information. Twenty (20%) managers suggested that marketing research was most important while another 21 (21%) managers considered marketing intelligence as the most important source of data and information. In comparing these responses with those of the 1980 survey, data processing have strengthened its position by 4% (up from 54%), marketing research by 1% (up from 19%), but marketing intelligence weakened by 6% (down from 27%).

### ***Data Processing Subsystem***

The past ten years have seen the implementation of several innovations that make transaction data entered into the database much more quickly than ever before. Point of sales (POS) scanners have become commonplace in the larger retail stores, and firms such as McKesson and American Hospital Supply have implemented interorganizational systems (IOS) [6, 20] that enable customers to place orders directly to the firm's central computer. The data provided by these systems are mainly internal accounting data which enables managers to track the firm's sales activities virtually in real time. The increased timeliness of the data may explain the increased reliance of the marketing managers on their data processing subsystems.

### ***Marketing Research Subsystem***

Marketing research has always been regarded as the premier method for gathering marketing data and information. Although substantial innovations have occurred during recent years that enhance its use, such as the development of microcomputer-based statistical and graphics packages, and computer-aided telephone interviewing (CATI), marketing research has remained the least valuable input source according to the *Fortune 500* managers.

### ***Marketing Intelligence Subsystem***

As a source of input into the MKIS, a firm must gather environmental data. Figure 2 shows that all of the 1990 firms (100%) gathered data on their customers and most (93%) of them have computerized the data. Sixty-one of the 99 firms (61%) gather data on the prospects and 34 firms have computerized the data. Most (74%) of the firms also gather data on their competitors, but only some (41%) have computerized the data. Figure 3 discloses that the most common source of competitor information is corporate annual reports, collected by 78 (80%) of 98 firms.

However, in only 10 of the 98 firms (10%) is the data entered into the computers.

The same situation exists for clipping services, with 61 firms (62%) engaging in such activities but only 9 firms (9%) entering the data into their computers. In terms of computer use, a more encouraging picture is presented by salesperson call reports that are utilized by 75 firms (77%) with 20 firms (20%) in a computerized form, and purchased reports bought by 74 firms (76%), with 30 firms (31%) in a computerized form.

Although the percentages of these sources are 6 to 10 percent higher than those of the 1980 responses, the percentages of computerization are quite consistent. This suggests that the *Fortune 500* firms have not changed their marketing intelligence systems very much. This stability seems to exist in spite of new options that are available such as commercial databases of competitive data, and database management systems designed to handle information in a narrative form.

In 1980, many firms have established formal offices concerned primarily with the collection of environmental data. This practice has not been changed much for customers (68% in 1980, 67% in 1990) and competitors data (50% in 1980, 42% in 1990). However, in the 1990, much fewer firms (20%, down from 48%) have formal offices collecting data on governments. This figure is expected because only a small number of 1990 firms (35%) are gathering the government data.

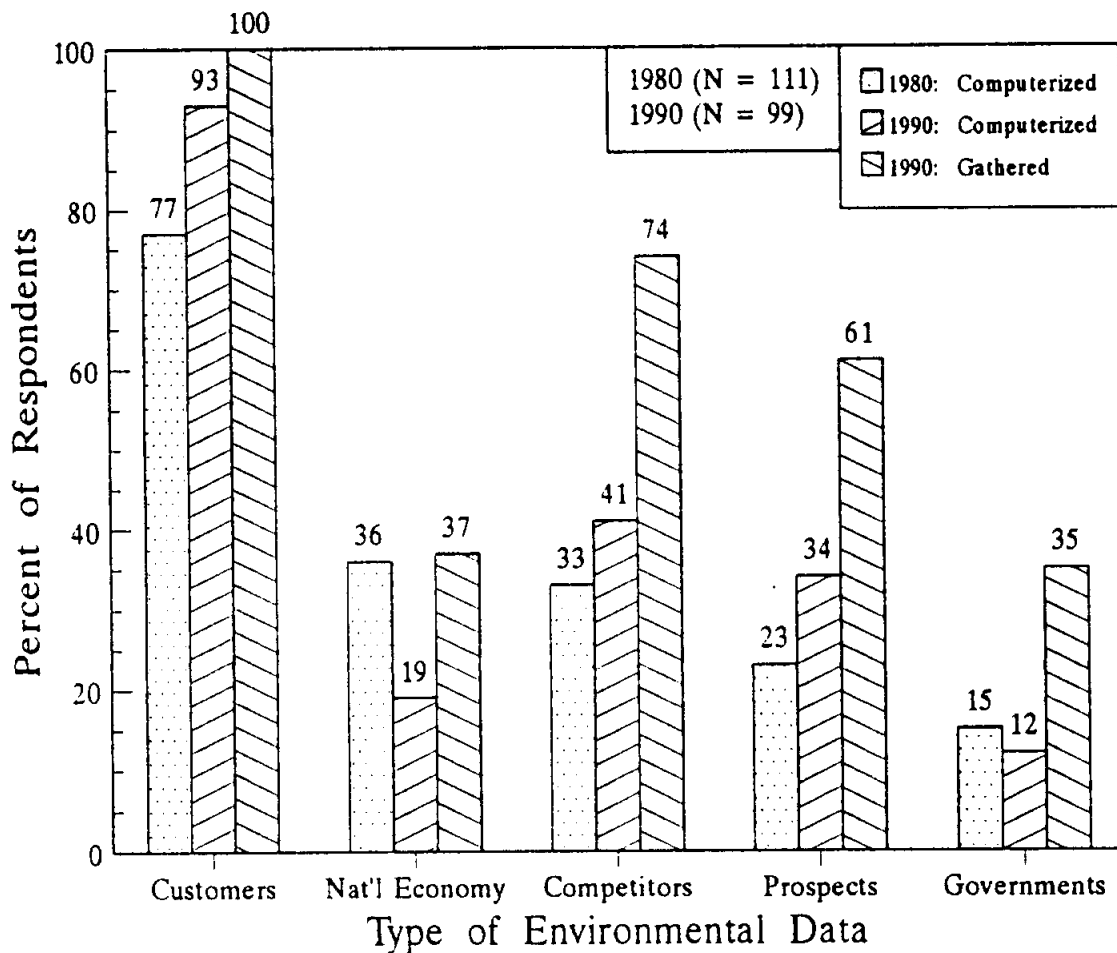


Figure 2. Environmental Data Collected for MKIS



Once the intelligence information has been gathered, most firms selectively disseminate it to those in the organization with a need to know. Seventy-four of 98 firms (76%) report this practice in 1990, compared to 77% in 1980.

These figures concerning the firms' input subsystems are encouraging. The *Fortune 500* firms are continuing to make improvements in data gathering, and are not relying completely on the accounting department for transaction data, although the role of that source has increased in importance during the past ten years.

### Information Producing Output Subsystems

The information system has traditionally provided output information in the form of periodic reports, responses to database queries, and results from mathematical simulations. Early MKIS designs called for these outputs to be produced in the information systems (IS) unit, and delivered to the manager through the company mail. In the early 1970s, it became possible for managers to produce the outputs in their own offices, using keyboard terminals. In addition to making information retrieval more convenient, the terminals provided the opportunity to quickly display the output on the screen.

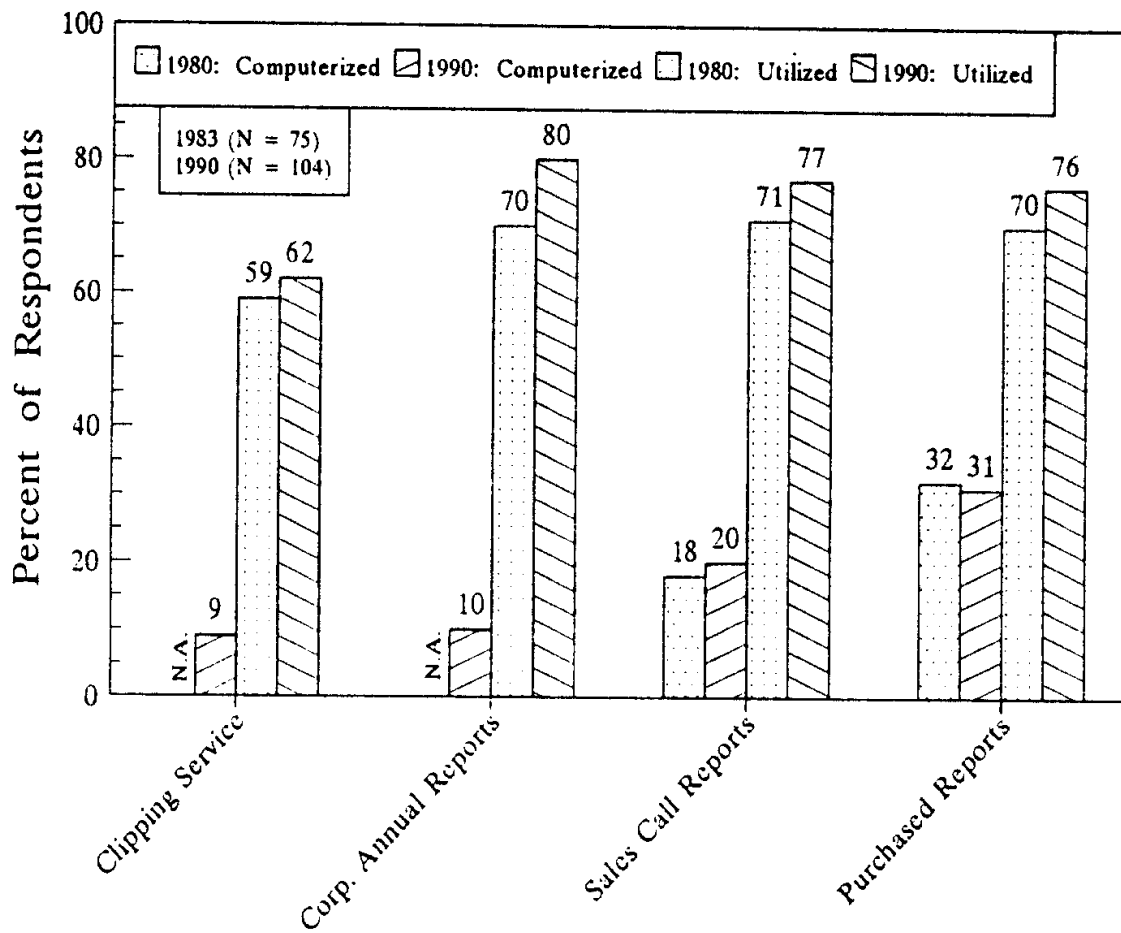


Figure 3. Sources of Competitor Information

## Computer Usage

In 1972, Boone and Kurtz surveyed *Fortune 500* companies and found that only 10% of the marketing managers had computer terminals [3]. In the 1980 study by McLeod and Rogers [29], this figure had risen to 51%; and in 1990, 93% of the marketing managers had terminals or personal computers (91 of 98 managers). There are four plausible factors for this huge increase: 1) the cost of computer hardware has significantly decreased during the 1980s, 2) the advent of personal computers in the early 1980s has made the power of computer available on a desk top [2], 3) the microcomputer software tools (such as Lotus 1-2-3, dBase, SPSS/PC, etc.) are more and more user-friendly which has attracted many marketers into using them [18], and 4) computers improve marketing efficiency and effectiveness which are vital to today's business [43]. This 1990 figure most likely represents a saturation point, since the situation today in *Fortune 500* companies is one where a terminal or personal computer (PC) is available to every marketing manager who wants one.

Not only are more managers using computers, they are using them more frequently. Figure 4 shows 63 of 91 managers (69%) use their computers daily, up from 44% ten years ago. Monthly use down from 7% to 2%, and only 5% of the 1990 managers never use them on a regular basis, compared to 25% in 1980.

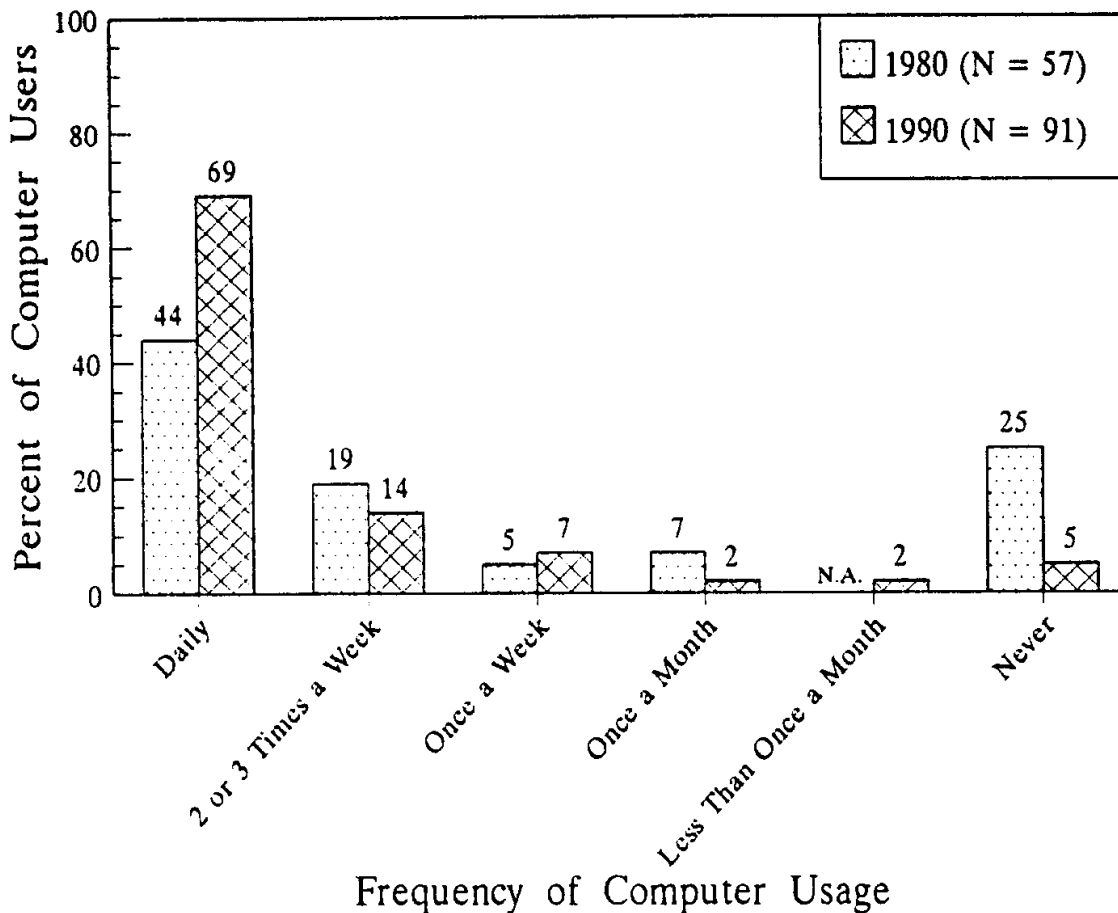
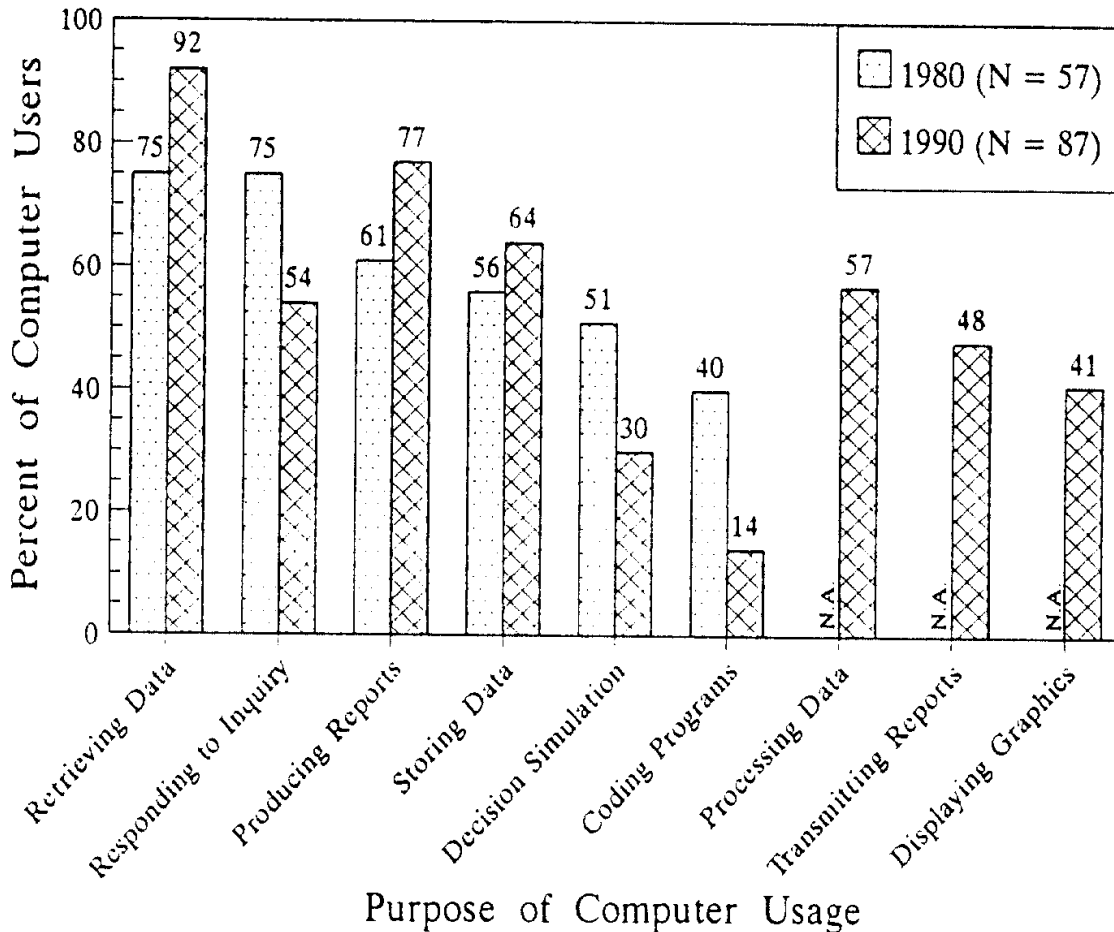


Figure 4. Frequency of Computer Usage

In 1980 the managers were using their terminals or PCs most often for retrieving information from the database (75%), followed by producing reports (61%), storing data (56%), decision simulation (51%), and coding programs (40%). In 1990, database retrieving had increased to 92% (80 of 87 managers), report producing to 77% (67 managers), and data storing to 64% (56 managers), as shown in Figure 5. However, the 1990 managers had a new use in fourth place—processing data. Fifty of the managers (57%) use their computers to process data. The 1990 managers also use their terminals or PCs to send and receive reports (42 managers, 48%) and display graphics (36 managers, 41%), but have decreased in their program coding activities to a level of 14% (12 managers).



**Figure 5. Purposes of Computer Usage**

In terms of software usage in the MKIS, the top five popular software categories are conventional (third generation language) programming (26%), decision modeling (24%), database management (20%), fourth generation languages (13%), and statistical analysis (7%). Very little usage has been done on logic programming (0.4%) and expert system shell (0.3%). This confirms the report of Higby and Farah [18] that expert systems were very little (6% of respondents) used by the marketing executives.

***Preprocessed Information***

One reason for the increased use of computers to retrieve data and information from the database is the storage of preprocessed information such as sales forecasts, market share, distribution trends, competitive sales, inventory, and pricing data. Sixty-eight (72%) of 95 firms in the 1990 survey follow this practice of anticipating managers' database queries and doing the processing ahead of time. This technique reduces the delay in providing the information to the managers, and is up substantially from the 50% level in 1980.

In the 1980 survey, many firms (69%) had explicitly included estimates of economic trends in their marketing forecasts. This type of information is typically supplied by the firm's financial information system or by a joint marketing-finance effort. It is an indication that there is a close tie between the marketing and the finance functions in the firm. In 1990, this practice continued to prevail as 53 of 97 managers (55%) indicated their firm had such a practice.

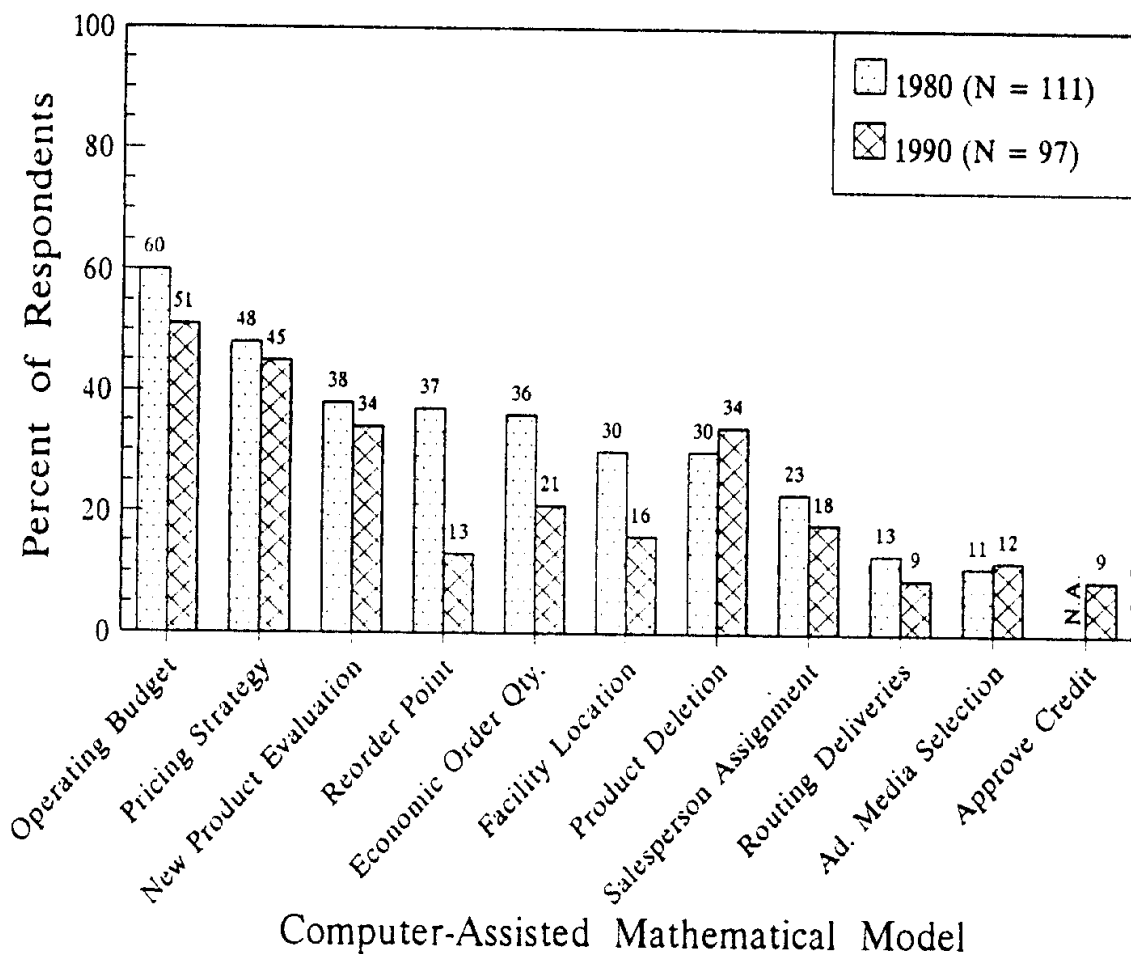


Figure 6. Use of Computer-Assisted Mathematical Models

### Mathematical Modeling

Mathematical modeling offers a potentially higher level of decision support than either periodic reporting or database querying. This is because only the mathematical model provides a look

into the future. The managers use this capability to play the "What-If" game, simulating the effects of different decisions.

In 1972, the Boone and Kurtz study revealed that 20% of the firms engaged in mathematical modeling [3]. This situation changed dramatically by 1980 with 60% using the computer to develop the operating budget, 48% to determine prices, 38% to select new products, 37% to compute reorder points, 36% to compute economic order quantities, and 30% to locate facilities and to delete products.

However, these high levels of modeling were not reported by the 1990 managers, as shown in Figure 6. The only applications showing an increase are product deletion (34%) and advertising media selection (12%). Otherwise, modeling use is down across the board, especially in determining reorder point, calculating economic order quantity, and locating facility site. This situation ties in with the infrequent use of computers for decision modeling; only 24% of software usage in MKIS is for decision modeling and 26 of 87 managers (30%) use their computers for decision simulation. Higby and Farah [18] also reported that only 32% of their respondents used decision support systems in marketing activities.

The decrease in modeling activity was not anticipated. If anything, an increase was expected due to the availability of user-friendly modeling software such as electronic spreadsheets. However, the respondents may not have regarded such software as examples of mathematical models because they are so easy to use and require relatively little skill to develop.

Another possible reason for the low model use is the high incidence of database retrieval. Perhaps the managers prefer the query responses to the decision modeling. Furthermore, many firms have used mathematical models to preprocess their information for managers' query retrievals. It may no longer be necessary for the managers to deal with the modeling details. If all these are true, then many of the assumptions regarding the role of modeling in decision support will have to be rethought.

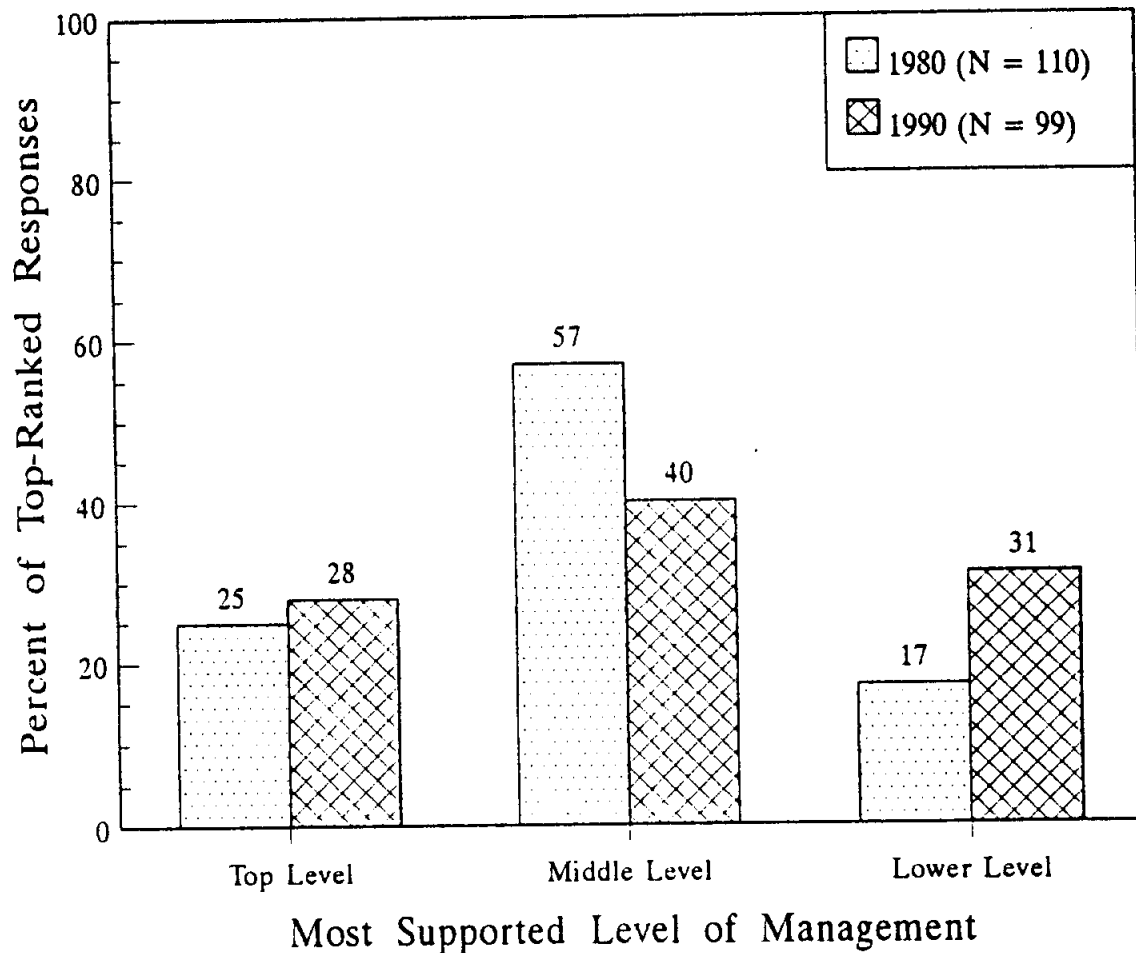
### **Support for Management Levels**

In addition to the overall decrease in modeling, some significant shifts in model use were reported. In 1980, 70% of the 88 top-ranked responses indicated that middle-level managers were receiving the most support from decision models. Only 17% felt that the top level was the main user, while 13% indicated that it was lower-level management. That situation was recognized as a healthy sign since early criticisms of the MIS labeled it as a support system for only the lower-level managers. In 1990, there was an increased popularity of models at the top and lower management levels. While the middle-level support reduced substantially to 54% (44 of 82 top-ranked responses), the top level increased to 30%. In a similar fashion, the support for the lower level was up to 16%.

These shifts in model support reflect the evolving character of the MKIS. During the past ten years, modeling has ceased to be an information-producing tool for primarily the middle management level. Rather, managers on all levels are now using models as a means of obtaining projection information, although the degree of use is down when compared to the other forms of output.

The same trend toward a more balanced use among the management levels can be seen in the overall support provided by the MKIS. When asked to rank the levels of marketing management based on the degree of support received from the MKIS, 57% of 110 managers in 1980 first listed the middle level, followed by the top level (25%), and finally the lower (17%).

In 1980, the MKIS designs were clearly aimed at supporting middle-level managers. In 1990, the middle-level support was down 17% to 40% (40 of 99 top-ranked responses), the support for the top level was up 3% to 28%, and for the lower was up 14% to 31%. Figure 7 illustrates these substantial shifts.



**Figure 7. MKIS Support for Marketing Management**

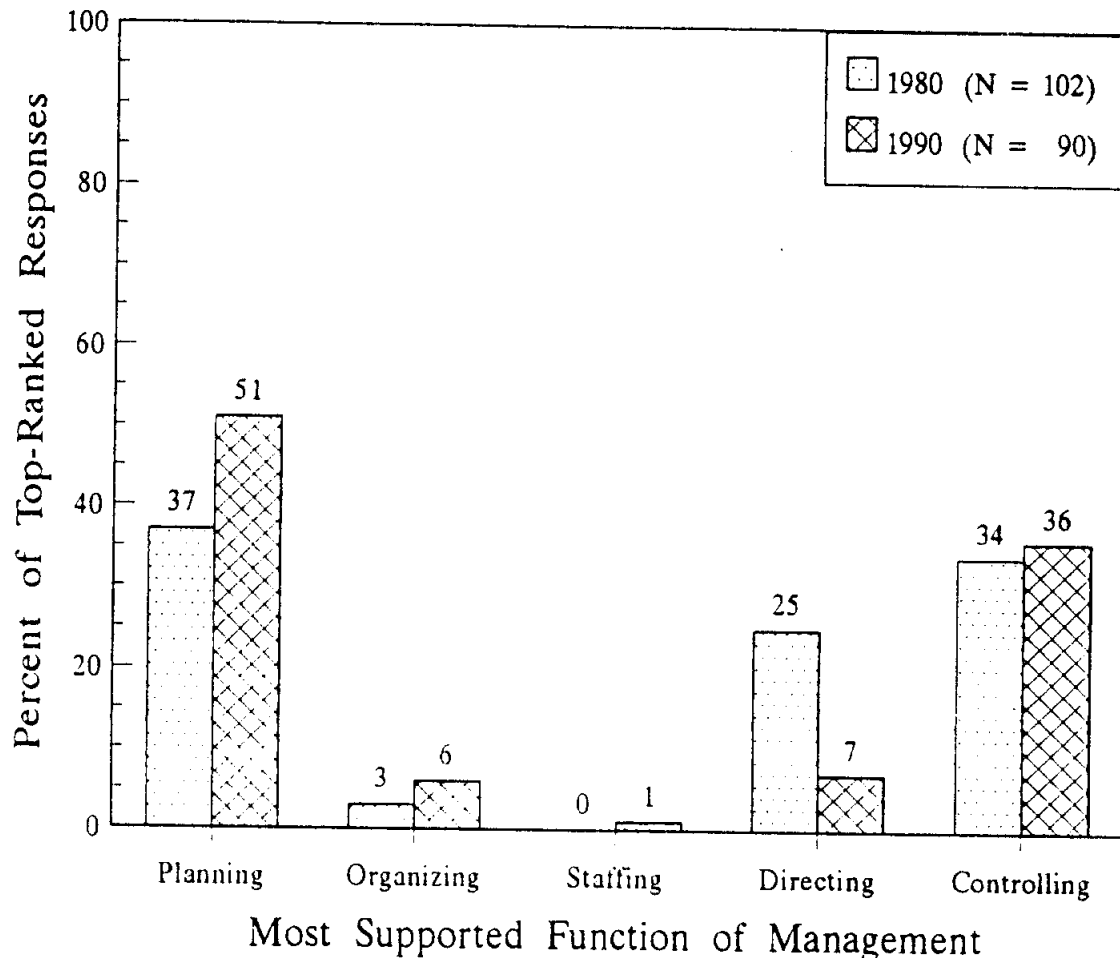
The shift in MKIS support to the top-management level comes as no surprise. One of the 1980 respondents recognized that the "top level desires a market information system," and another predicted that top-level support "will change to a much higher (rank) in eighteen months [29]."

Not only are the top-level marketing managers relying on the computer to a greater degree, but use by executives in other organizational units is up as well. Software houses such as Comshare, Pilot, and Execucom are marketing their mainframe-based executive information systems (EISs) especially for executive use, and their primary targets are the *Fortune 500* companies. Because of the size of the target organizations, large numbers of executives are becoming regular computer users [41].

**Support for Management Functions**

Other shifts in MKIS support can be seen in the functions that managers perform. These functions (Planning, Organizing, Staffing, Directing, and Controlling) that were identified by classical management theorist Henri Fayol in 1916 have traditionally been used to categorize the work that managers perform.

The chart in Figure 8 shows the distribution of MKIS support among the functions as reported in 1980. Most of the managers viewed the MKIS as a system primarily aimed at supporting the marketing managers as they did their Planning, Directing, and Controlling. Thirty-eight (37%) of 102 top-ranked responses suggested that the MKIS supported Planning the best, while 34% favored Controlling and 25% Directing. Quite the opposite support was offered for Organizing (3%), and, to a more dramatic degree, Staffing. None of the respondents believed Staffing to offer the most support.



**Figure 8.** MKIS Support for Marketing Management Functions

A corresponding distribution can be seen for 1990. Forty-six of 90 top-ranked responses (51%) believed Planning to hold the top position. Support for Controlling remained stable at 36%. The big shift is in Directing; its support has decreased dramatically, with only 7 % now supporting this as a primary function. Organizing gained some support, as did Staffing.

Some of these shifts are easier to explain than others. The increased popularity of Planning

ties in with the increased MKIS support at the top-management level since executives are usually seen as placing the most emphasis on that function. The slightly improved support for Organizing and Staffing can be linked with recent emphasis on human resource information systems (HRIS). Such systems are not the exclusive bailiwick of the human resources unit, but are made available to users throughout the firm. Perhaps marketing managers are taking advantage of the HRIS as they go about their Organizing and Staffing.

The loss of support for Directing is difficult to explain. Perhaps it did not lend itself to computerization. Recent advancement in office automation (OA) technology has provided marketing managers the telecommunication tools such as video conferencing, computer conferencing, electronic mail, electronic bulletin board, hypertext conferencing, and hypermedia conferencing to communicate their directives to their subordinates. Surprisingly, the figures from the 1990 study shows that only electronic mail (71%) is prevalent, followed by electronic bulletin board (26%), computer conferencing (9%), and video conferencing (9%). None of the firms are using hypertext or hypermedia conferencing technologies which can mix data with text or graphs, or even voice and motion video. Although not measured in the survey, it should be noted that as a telephone services subscriber, a *Fortune 500* company should have the telephone-conferencing and voice-mail capabilities. However, these capabilities do not lend themselves to source document automation and must supplemented with pertinent data to facilitate decision making.

### **Support for the Marketing Mix**

Another way to view the MKIS is to measure how well it supports the manager in making decisions relative to the ingredients of the marketing mix—the *Four P's*. Since marketing decisions deal with these ingredients, they provide a convenient classification for marketing management activity.

When asked to rank the marketing mix ingredients in terms of support from the MKIS, 49% of the 104 top-ranked responses in 1980 indicated that Product was supported the most, followed by Price (27%), Place (16%), and Promotion (8%). Figure 9 shows this distribution.

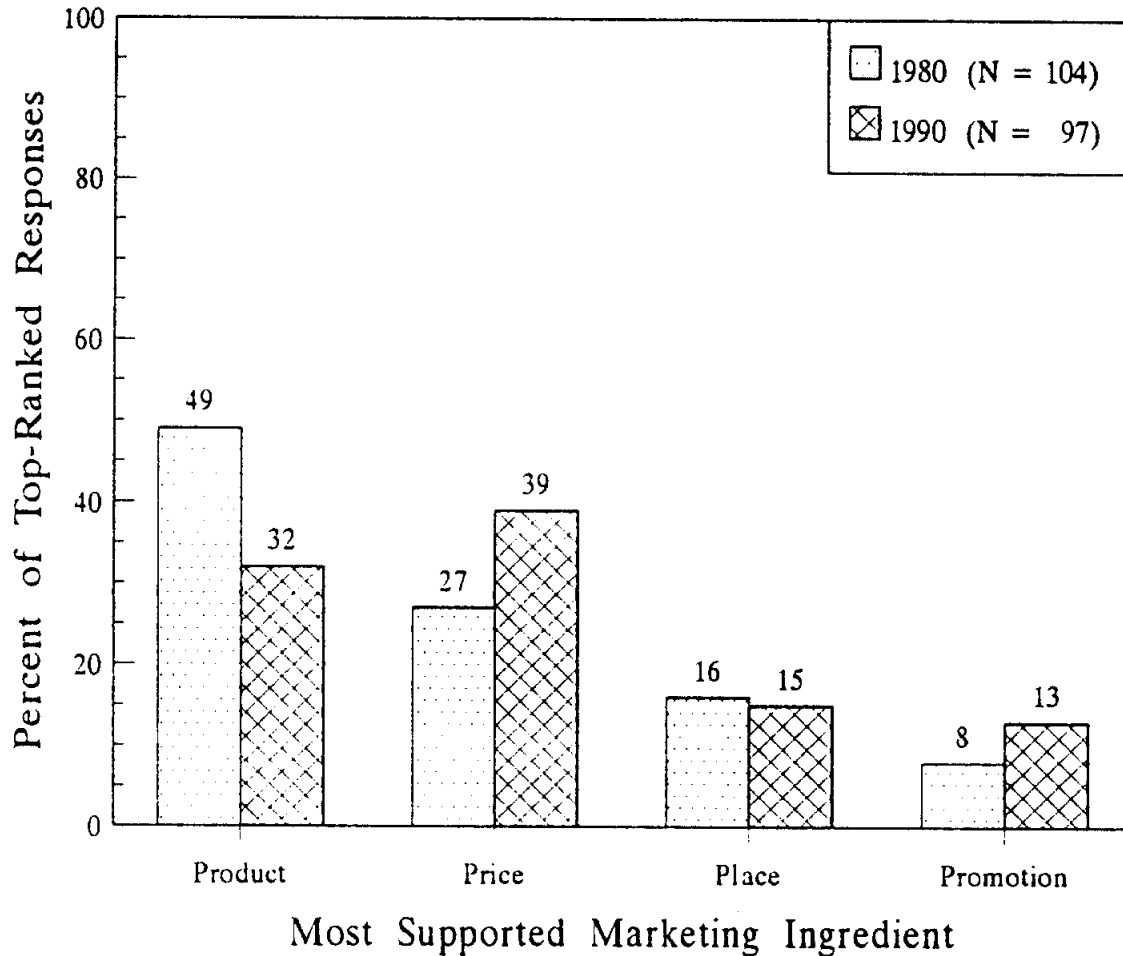
When the 1980 results were reviewed, it was recognized that Promotion is difficult to support on the computer since so much of the activity, especially that relating to advertising and sales promotion, is creative. The relatively poor showing of Place was more difficult to explain. That part of marketing activity, relating to the storage and movement of goods as they make their way through the distribution channel to the consumer, should lend itself to quantification, and thus, computerization.

It is clear that the 1990 survey saw no real change in support for Place decisions, with only 15% (15 of the 97 top-rank responses) associating it with the highest level of support. One explanation might be that many of the Place decisions are now being made by managers in other areas of the firm, such as manufacturing or materials management. Even so, that does not explain why the increased computer use in retailing, most obvious in the form of POS systems, is not reflected to some degree in the 1990 figures.

The other trends are less perplexing and more encouraging. The previously strong support for Product decisions has fallen to 32%, and those for Price and Promotion decisions have increased to 39% and 13%, respectively. The emergence of Price as the ingredient supported the most is a dramatic one. It indicates that marketing managers are focusing the computer on one of their most important, and difficult, decision areas. It was found that the description of pricing



decisions are most likely (56% or 53 of 94 managers) stored on a computer for ready access, followed by the product decisions (43%), the place decisions (34%), and the promotion decisions (27%).



*Figure 9. MKIS Support for the Marketing Ingredients*

### What Does the Future Hold for the MKIS?

Now that the concept of MKIS has been with us for more than twenty-five years, is it as strong today as ever? The answer is probably "No." This conclusion is borne out by both the literature and the 1990 survey. A review of the citations in the literature reveals a high level of activity during the late 1960s and 1970s as the theoretical groundwork was being laid [4, 8, 9, 21, 23, 25, 33]. Then, the 1980s saw the literature turn to descriptions of MKIS applications rather than the overall system [1, 7, 10, 11, 13, 14, 15, 16, 24, 26, 27, 32, 38, 42, 44]. A likely explanation for the current attention to applications is the fact that marketers established the structure of their MKISs long ago, and the literature has switched its focus to the more difficult tasks within that structure. Marketers are using their computers for decision support, but such use is seldom identified with the MKIS.

The first question on the 1990 survey perhaps offers a more vivid picture of the shift of

attention away from the MKIS. When asked "Does your firm have a marketing information system (be it manual or computer-based)?" 33 of the 132 respondents (25%) answered "No." It is difficult to conceive of a *Fortune 500* company that is not providing any decision support to its marketing managers. A plausible conclusion is that the MKIS has lost its identity as a separate system—even as a separate conceptual system. If such is the case, the firms are providing the needed decision support, but the users are not aware that it is coming from an MKIS.

This may very well be true. Computer use in firms of all sizes during recent years has been influenced by trends that draw attention from the MKIS. These trends include end-user computing (EUC) and the information resources management (IRM) concept.

### ***End-User Computing***

The explosion in the use of personal computers (PCs) in firms during the past decade is obvious [2, 32, 34, 40, 43]. Increased computer literacy on the part of managers and other employees, combined with the low costs of PC hardware and software have resulted in such systems being installed by the hundreds and thousands in single firms. Our survey reveals that although mainframe computers remain as the major hardware for the MKISs, PCs have become increasingly popular in the MKIS arena. On the average, 26% of MKIS usage has been on PCs while 49% has been on mainframe computers. There appears to be a significant negative relationship ( $r = -0.60$ ,  $p < 0.001$ ) between PC and mainframe uses. Mainframe computers appear to give way to PCs in the firms. The higher the PC usage, the lower the mainframe usage in a firm.

At first, top management regarded this proliferation of PCs as a positive trend. After all, for years the information systems (IS) people had been working to stimulate computer use. But, things began to get out of hand. Top management and IS management realized that control over the firm's information resources was being lost. Systems were being implemented that did not adhere to standards, the applications were not properly documented, and individuals were maintaining their own databases at the expense of a single, accurate, secure corporate database.

In response to the EUC movement, firms began to impose constraints. First accomplished in a rather helter-skelter manner, the constraints took the form of regulations regarding the acquisition of PC hardware and software, and the establishment of information centers where employees could go and use hardware and software that were provided. These constraints worked quite well, and eventually became incorporated into a concept called information resources management, or IRM [17].

### ***Information Resources Management***

When a firm embraces the IRM concept, it recognizes that information is a valuable resource—a resource that can enable the firm to do a better job of competing in the marketplace—an ability called "competitive advantage" [35]. This recognition of information as a resource is accompanied by the inclusion of the top IS executive in corporate policy making and strategic planning. The idea is that the IS executive will work on an equal basis with the president and the vice-presidents from the functional areas in making the key corporate decisions. A name that has been used to identify the IS executive acting in this role is the chief information officer (or CIO) [39].

Although the term CIO has been used for several years, it has been adopted very slowly.

Many IS executives operating in the above manner do not have the CIO title [5]. Also, it is likely that many executives with the title do not enjoy the status that the title implies. But, the title is not the critical issue. What is key is the representation of the information resource in the top-level decision making that affects the entire organization.

One of the main responsibilities of the CIO is to develop a long-range plan for the firm's information resources [22, 37]. For many years, the recommended approach was to develop an IS plan that supported the corporate strategic plan. The firm did its planning first, and then IS created a plan to support the corporate plan. Although it seemed logical at the time, this was a knee-jerk approach. Today, it is recognized that the firm's information resources should influence the corporate plan, in the same manner as do the other resources such as finances, facilities, and personnel. This new philosophy means that development of the IS plan is a two-step process. First, the information resources influence the corporate plan (including the marketing plan), and second, the IS plan is developed to support the corporate plan.

### ***Marketing and the IS Unit***

Marketers have always recognized the importance of marketing plans, and 88 of 99 managers (89%) responded that their firms have formal, written plans. The managers were also asked whether their firms had a company-wide computer information system (CIS), and 76 of 99 managers replied "Yes." Fifty-five (72%) of 76 managers indicated their firms had formal, written CIS plans. The managers were then asked whether the CIS plan was influenced by the marketing plan, and only 31 of 50 managers (62%) replied "Yes." Finally, the managers were asked whether the marketing plan was influenced by the CIS plan, and only 49 of 83 managers (59%) replied "Yes." These responses indicate that marketing and IS are engaging in independent strategic planning in many *Fortune 500* companies. This is very surprising because with today's intensive global competition one would expect that large corporations such as the *Fortune 500*'s should be on the forefront of linking IS plans with business plans to create competitive advantages [19, 28, 35]. Perhaps the problem complexities and the communication difficulties inherent in large companies have hindered their strategic uses of information resources. The actual causes of this planning situation are not investigated in this study.

### ***Forces Exerting a Negative Influence on the MKIS***

As the firm's executives continue to view the computer as a tool that is crucial for the firm to achieve its strategic objectives, the resultant policies may well smother any efforts to maintain or expand lower-level systems such as the MKIS. The emphasis may be totally dedicated to how the company should best apply its information resources. If the CIO achieves a significant influence in the firm's strategic IS plan, and this influence is reflected in the firm's IRM policies, this renewed emphasis on centralized control may become the dominant force in determining how the computer resources are used. It is too early to tell whether this will happen. However, this study shows that many (25%) of the surveyed firms have no MKISs, suggesting that such a trend may already be taking place.

### ***Forces Exerting a Positive Influence on the MKIS***

A strong case can be made for increasing the visibility and scope of the MKIS. The impetus for

this trend will come from end-user computing. Regardless of the controls that are imposed as a part of the firm's IRM policy, the distribution of information resources throughout the firm will continue. Computer use has simply become too popular to be controlled entirely by the IS unit. The next few years should see a continuation of the relocation of hardware, data, and information specialists from the IS unit to user areas [12]. Since marketing has always championed its own information system, the framework is there to absorb the added resources.

### *The Current Performance of the MKISs within the Firms*

The topic of competitive advantage has focused the attention of the firm's executives not only on the information resources, but also on the marketplace. While this might come as good news for marketing in general, it could be bad news for the MKIS. Firms such as American Airlines, United Airlines, McKesson, and American Hospital Supply have been able to use their computers very effectively in achieving competitive advantage, but such benefits have not been realized across the board. When the 1990 managers were asked whether their company-wide information system or their MKIS had created a competitive advantage, only 53 of 94 managers (56%) replied "Yes."

**Table 3. Distributions of MKIS Satisfaction and Competitive Advantage**

Type of industry	Level of MKIS satisfaction							Competitive advantage	
	Very dissatisfied ↔ Very satisfied							Yes	No
	1	2	3	4	5	6	7		
<i>Product-related companies:</i>									
Metal mining		1							1
Coal mining				1	1			1	1
Oil & gas Extraction		1		1	1			2	1
Mining & quarrying of nonmetallic minerals, except fuels			1					1	1
<i>Manufacturing companies:</i>									
Food & kindred products		2	2	1	3	2		5	5
Textile mill products			1						1
Furniture & fixtures			1		1			1	1
Paper & allied products	1	1	2					1	3
Printing, publishing & allied industries					1				1
Chemicals & allied products		5	3					2	5
Petroleum refining & related industries				1	1	1		3	
Rubber & miscellaneous plastic products		1							1
Stone, clay, glass, & concrete products			1	1			1	1	2
Primary metal industries			2	2				1	3

Fabricated metal products, except machinery & transportation equipment	1		2		2			3	1
Industrial & commercial machinery & computer equipment	1		2	1	2			3	3
Electronic & electrical equipment & components except for computers			2		2	1		5	
Transportation equipment		1		1	1		1	4	
Measuring, analyzing & controlling instruments			1	1		1			3
<i>Service-related companies:</i>									
Motor freight transportation & warehousing				1	1			1	1
Electric, gas & sanitary services	1	1	2		2	3		6	3
Wholesale trade--durable goods		1							1
Wholesale trade--nondurable goods					1			1	
General merchandise stores			1						1
Food stores	1								1
Miscellaneous retail					1			1	
Depository institutions		1				1	1	2	1
Insurance carriers		1	1	1	2			4	1
Insurance agents, brokers & service						1		1	
Holding & other investment offices			1	1				2	
Business services (including EDP)					1			1	
Health services				1				1	
Column total:	5	16	25	14	23	10	3	53	41
Percent of column total:	5.2	16.7	26.0	14.6	24.0	10.4	3.1	56.4	42.6

Another measure of the success of the MKIS is the satisfaction of its users. When asked to rate their degree of satisfaction with their MKIS, the 1990 managers responded as shown in Table 3. On a 7-point semantic differential scale, 36 of 96 managers (38%) expressed some degree of satisfaction (points 5, 6, and 7), while 46 managers (48%) were on the dissatisfied side (points 1, 2, and 3). The mean response was 3.79 indicating that the managers in general are somewhat dissatisfied with their MKISs. The distributions of MKIS satisfaction and its competitive advantage are exhibited in TABLE 3. Based on the chi-square test, there were no significant differences in these two distributions by industry. Higby and Farah [18] also reported that the respondents had low average ratings (ranged from 2.66 to 3.2 on a 6-point scale) toward their satisfaction with the marketing activities supported by the MKIS. All these findings

suggest that the situation in many *Fortune 500* companies might be one where the MKIS is not performing well in the eyes of the marketing executives. This is a dangerous situation in light of the current emphasis on controlling the information resources under the intense global competition in today's marketplace.

### **Implication for the Direction of MKIS**

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BASED ON OUR FINDINGS, MKISs IN THE *Fortune 500* seem to be moving on the right track during the 1980s. Although decision modeling using computers for marketing activities has seen some decrease, the model use among the top level and the lower level of marketing management are up significantly. More environmental data are being collected for the MKISs and computers are being used more by the marketers on a daily basis. The MKIS support for the three levels of management appears to be more balanced with significant increases at the top level and the lower level of marketing management. Unfortunately, there is a sign that the MKIS is heading for potential destruction. As discussed earlier, many marketers (48%) are not satisfied with their existing MKISs and many firms (over 40%) do not link their MKISs with their ISs to create competitive advantages. In today's businesses, the computer information system is considered as a corporate resource, it is shared by all the functional areas in the firm. Marketers must work closely with the CIO and the other functional personnel. With the growing popularity of end-user computing, maintaining the quality of MKIS is no longer the responsibility of a CIO. Marketers must take charge of their own MKISs. If they want the MKIS is to continue to exist as a separate entity, they must actively participate in the establishment of the firm's IRM policies, and in the development of the strategic IS plan. In both of these roles, the vice-president of marketing should establish a close working relationship with the CIO. By the same token, when marketing managers go about their strategic planning, they should solicit the CIO's participation. The two groups cannot continue to go their separate planning ways as is currently the case in approximately 40 percent of the *Fortune 500* firms.

Figure 10 illustrates how both marketing and IS planning should exist within the IRM framework. The vice-president of marketing and the CIO are members of the executive committee, along with the president and other functional vice-presidents. This committee responds to influences from the competitive environment and formulates the firm's strategic plan, considering the relative strengths of all of the firm's resources, including information. The functional executives then work together to draft their own strategic plans. This cooperative effort can be seen in the two-headed arrows that connect the strategic planning boxes in the lower part of the figure.

Marketing managers have traditionally worked with managers from other functional areas, such as manufacturing and finance, in developing their marketing plans. It should be a simple matter to achieve this same involvement with IS. Any conflict between IS and marketing management is to the detriment of the organization and certainly affects its ability to plan strategically. Only through the cooperation of marketing with IS can the firm be assured of proper strategic planning, and marketing management be assured that the MKIS will continue to exist.

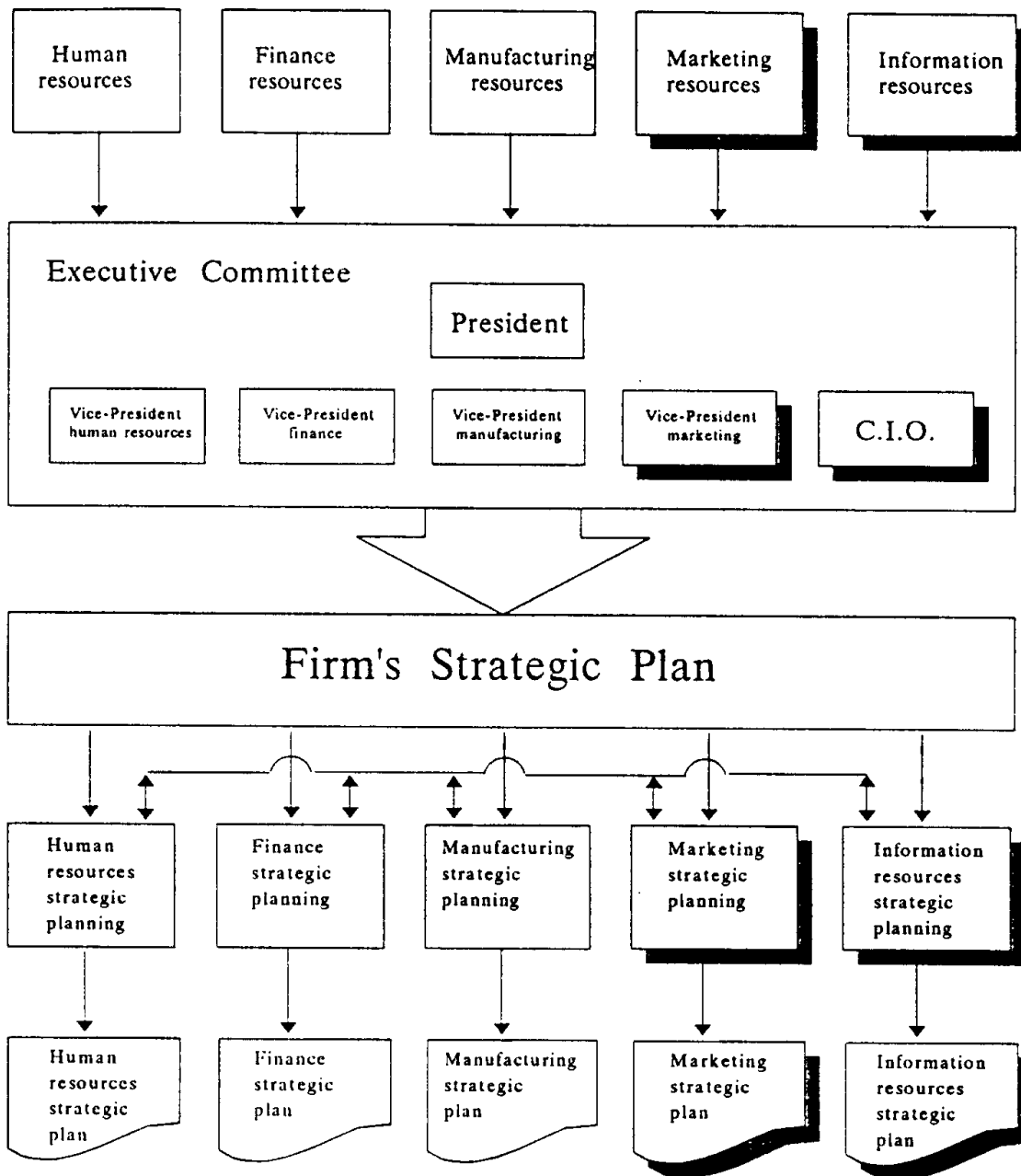


Figure 10. The MKIS in Information Resources Management

### Conclusion

THIS STUDY UPDATES TWO PREVIOUS STUDIES that had examined the nature of MKISs in *Fortune 500* firms in 1972 [3] and 1980 [29]. The questionnaire utilized in the present study includes all the questions used in 1980 [29]. Consequently, the results are of a longitudinal nature and therefore present an evolving picture of the MKIS.

The MKIS, as it was conceptualized some 25 years ago, was envisioned as a subsystem which would support decision making in marketing. This general conception of the MKIS has changed very little over that time period. However, the decision support function of the MKIS

has changed drastically over the last 25 years.

Marketing managers in *Fortune 500* firms are now actively involved with PCs or terminals. Twenty-six percent of computer hardware used by the firms' MKISs are of personal computers. In 1972 [3] only 10% of the firms' marketing managers were using computers while in 1990 over 93% are using computers. Further, these managers are using their PCs or terminals much more frequently than they did ten years ago. Essentially, these marketing managers now have instant access to the firms' MKIS to support their decision making activities.

It is interesting to note that the marketing managers have decreased their use of modeling but model use has seen increases among both the top level and the lower level managers. These shifts, in model use by management level, reflect the evolving nature of the MKIS. This trend toward a more balanced decision support role of the MKIS can be seen in the overall support provided by the MKIS. As with modeling, the overall support of the MKIS has grown at the top and lower management levels, and has become more balanced among the three levels of management.

The decision support function of the MKIS regarding marketing mix decisions has also changed quite dramatically over the past 10 years. Product decisions used to be the most supported one, followed by the pricing decisions. Today this order has been reversed. Support for product decisions has decreased by 17% (from 49% to 32%) whereas the support for pricing decisions has increased by 12% (from 27% to 39%). It is intriguing to note that the MKIS support for the place or physical distribution decisions has remained about the same over the last ten years, possibly even declining somewhat. This is a rather alarming finding! It confirms what Peter Drucker and others concluded some 30 years ago, that the area of logistics is a lost frontier and suggests that the place variable is still looked at as a cost constraint rather than a competitive weapon. At any rate, the MKIS support for the place variable remains alarmingly low.

For the past three decades, marketers have been taking advantage of developments in technology and methodology to increase the level of decision support. However, as marketers look to the 1990s, they should be aware of existing pressures that could either increase the role of the marketing information system in their firms, or eliminate it entirely. The results of this study reveal that while IS has made great strides in *Fortune 500* firms, it may be at the cost of the MKIS. The 1990 marketing managers suggest that internally in their firms there is some conflict between IS and marketing. This notion is supported by the marketing managers' dissatisfaction with their MKISs as well as by the lack of linkage between marketing and IS plans to create competitive advantages. It seems that with the growing importance of IS and the possible conflict between IS and marketing, there is a great pressure on the MKIS in these firms. If this conflict is not resolved in the near future, the MKIS may be destined for a lesser role than in the past.

## REFERENCES

1. Beath, C.M., and Ives, B. Competitive information systems in support of pricing. *MIS Quarterly*, 10, (March 1986), 85-96.
2. Berry, D. How marketers use microcomputers—now and in the future. *Business Marketing*, 68, (December 1983), 44, 48-49, 52-53.
3. Boone, L.E., and Kurtz, D.L. Marketing information systems: current status in American industry. In Fred C. Allwine, ed., *Relevance in Marketing: Problems, Research Action*. Chicago: AMA Proceedings, (1972), 163-167.



4. Brien, R.H., and Stafford, J.E. Marketing information systems: a new dimension for marketing research. *Journal of Marketing*, 32, (July 1968), 19-23.
5. Carlyle, R.E. CIO: misfit or misnomer? *Datamation*, 34, (August 1, 1988), 50-56.
6. Cash, J.I., Jr., and Konsynski, B.R. IS redraws competitive boundaries. *Harvard Business Review*, 63, (March-April 1985), 134-142.
7. Collins, R.H. Salesforce support systems: potential applications to increase productivity. *Journal of the Academy of Marketing Science*, 15, (Summer 1987), 49-54.
8. Cox, D.F., and Good, R.E. How to build a marketing information system. *Harvard Business Review*, 45, (May/June 1967), 145-154.
9. Crissy, W.J.E., and Mossman, F. Matrix models for marketing planning: an update and expansion. *MSU Business Topics*, 25, (Autumn 1977), 17-26.
10. Davis, L. Retailers go shopping for EDI. *Datamation*, 35, (March 1, 1989), 53ff.
11. Deshpande, R., and Zaltman, G. A comparison of factors affecting use of marketing information in consumer and industrial firms. *Journal of Marketing Research*, XXIV, 1 (February 1987), 114-118.
12. Donovan, J.J. Beyond chief information officer to network manager. *Harvard Business Review*, 66, (September-October 1988), 134-140.
13. Ferreira, J., and Treacy, M.E. It's more than just laptops. *Datamation*, 34, (November 1, 1988), 127-131.
14. Gilad, T., and Gilad, B. Business intelligence—the quiet revolution. *Sloan Management Review*, 27, (Summer 1986), 53-61.
15. Goldstein, D.K., and Zack, M.H. The impact of marketing information supply on product managers: an organizational information processing perspective. In Janice I. DeGross and Margrethe H. Olson, eds., *Proceedings of the Ninth International Conference on Information Systems*, Minneapolis, MN, November 1988, 65-78.
16. Goslar, M.D. Marketing and the adoption of microcomputers: an application of diffusion theory. *Journal of the Academy of Marketing Science*, 15, (Summer 1987), 42-48.
17. Guimaraes, T. Information resources management: improving the focus. *Information Resources Management Journal*, 1, (Fall 1988), 10-21.
18. Higby, M.A., and Farah, B.N. The status of marketing information systems, decision support systems and expert systems in the marketing function of U.S. firms. *Information & Management*, 20, 1 (January 1991), 29-35.
19. Ives, B., and Learmonth, G.P. The information system as a competitive weapon. *Communications of the ACM*, 27, (December 1984), 1193-1201.
20. Johnston, H.R., and Vitale, M.R. Creating competitive advantage with interorganizational information systems. *MIS Quarterly*, 12, 2 (June 1988), 153-165.
21. King, W.R., and Cleland, D.I. Environmental information systems for strategic marketing planning. *Journal of Marketing*, 38, (October 1974), 35-40.
22. King, W.R. Strategic planning for information resources: the evolution of concepts and practice. *Information Resources Management Journal*, 1, (Fall 1988), 1-8.
23. Kotler, P. A design for the firm's marketing nerve center. *Business Horizons*, 9, (Fall 1966), 63-74.
24. Leong, S.M., Busch, P.S., and John, D.R. Knowledge bases and salesperson effectiveness: a script-theoretic analysis. *Journal of Marketing Research*, 26, (May 1989), 164-178.
25. Little, J.D.C. Decision support systems for marketing managers. *Journal of Marketing*, 43, (Summer 1979), 9-26.

26. Malhotra, N.K., Tashchian, A., and Mahmoud, E. The integration of microcomputers in marketing research and decision making. *Journal of the Academy of Marketing Science*, 15, (Summer 1987), 69-82.
27. McCusker, T. IS drives distribution. *Datamation*, 34, 22 (November 21, 1988), 20.
28. McFarlan, F.W. "Information Technology Changes the Way You Compete," *Harvard Business Review*, Vol. 62, No. 3, May-June 1984, pp. 98-103.
29. McLeod, R., Jr., and Rogers, J.C. Marketing information systems: uses in the Fortune 500. *California Management Review*, 25, (Fall 1982), 106-118.
30. McLeod, R., Jr., and Rogers, J.C. Marketing information systems: their current status in Fortune 1000 companies. *Journal of Management Information Systems*, 1, (Spring 1985), 57-75.
31. McLeod, R., Jr. *Management Information Systems*. 4th edition, New York: Macmillan, 1990, 308-311, 491-532.
32. Mentzer, J.T., Schuster, C.P., and Roberts, D.J. Microcomputer versus mainframe usage by marketing professionals. *Journal of the Academy of Marketing Science*, 15, (Summer 1987), 1-9.
33. Montgomery, D.B., and Urban, G.L. Marketing decision-information systems: an emerging view. *Journal of Marketing Research*, 7, (May 1970), 226-234.
34. Munro, M.C., Huff, S.L., and Moore, G. Expansion and control of end-user computing. *Journal of Management Information Systems*, 4, (Winter 1987-88), 5-27.
35. Parsons, G.L. "Information Technology: A New Competitive Weapon," *Sloan Management Review*, Vol. 25, No. 1, Fall 1983, pp. 3-14.
36. Porter, M.E., and Millar, V.C. How information gives you competitive advantage. *Harvard Business Review*, 63, (July-August 1985), 149-160.
37. Ragahunathan, T. S., and King, W.R. The impact of information systems planning on the organization. *OMEGA: The International Journal of Management Science*, 16, 2 (1988), 85-93.
38. Rao, V.R., and McLaughlin, E.W. Modeling the decision to add new products by channel intermediaries. *Journal of Marketing*, 53, (January 1989), 80-88.
39. Rockart, J.F. The changing role of the information systems executive: a critical success factors perspective. *Sloan Management Review*, 24, (Fall 1982), 3-13.
40. Rockart, J.F., and Flannery, L.S. The management of end user computing. *Communications of the ACM*, 26, (October 1983), 776-784.
41. Rockart, J.F., and DeLong, D.W. *Executive Support Systems*. Homewood: Dow Jones-Irwin, 1988.
42. Steinberg, M., and Plank, R.E. Expert systems: the integrative sales management tool of the future. *Journal of the Academy of Marketing Science*, 15, (Summer 1987), 55-62.
43. Taylor, T.C. Marketers and the PC: steady as she goes. *Sales and Marketing Management*, (August 1986), 53-55.
44. Zinkhan, G.M., Joachimsthaler, E.A., and Kinnear, T.C. Individual differences and marketing decision support system usage and satisfaction. *Journal of Marketing Research*, XXIV, 2 (May 1987), 208-214.