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# Marketing information systems in *Fortune* 500 companies: a longitudinal analysis of 1980, 1990, and 2000

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Received 28 June 2000; accepted 14 September 2000

## Abstract

Soon after the MIS concept was formed in the mid-1960s, the marketing function applied it to its own information needs, creating a formal effort called the marketing information system, or MKIS. This study surveys *Fortune* 500 companies to reveal their pattern in MKIS usage. The findings are compared to two previous studies a decade apart. It provides a gauge of the evolution of computer use not only in marketing but also in large firms. This study is the first where the marketing managers reported a decrease in the existence of an MKIS in their firms. Nonetheless, the study found that many firms are linking their marketing plans with their information resources. Besides telephone, facsimile, and e-mail, electronic commerce is widely adopted in these large firms. Most importantly, many marketers today are using computers and the Internet. They are more and more knowledgeable about computer technologies and actively taking part in creating computer applications to meet their own information needs. © 2001 Elsevier Science B.V. All rights reserved.

**Keywords:** Competitive advantage; Computer usage; Electronic commerce; Information resources; Management functions; Management levels; Marketing information system; Marketing mix; Mathematical modeling; Strategic plan

## 1. Historical perspective

Marketing was the first functional area to embrace the concept of a management information system (MIS) and tailor it to the needs of its managers. In 1966, Philip Kotler coined the term Marketing Nerve Center and explained how a firm could create a

separate area for its computer resources dedicated to supporting marketing activity [10]. This notion was immediately grasped by a number of marketing academicians who developed conceptual models of marketing information systems (later given the acronym MKIS) to illustrate system components and uses. Montgomery and Urban [21] and Crissy and Mossman [5] viewed the MKIS as a decision support system, whereas King and Cleland [9] recognized its value in planning marketing strategy. Brien and Stafford [2] described how the MKIS could be used in developing marketing programs. All of these models reflect systems concepts by showing the transformation of data inputs into information outputs, with marketing management serving as a control unit and feedback

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mechanism, using the outputs to make changes in the firm's operations and its environment.

With the groundwork laid by the theoretical models, marketers turned their attention to applying evolving computer technology to the model components. The computer has been applied to both input subsystems [3,20,26], and output subsystems [1,7,22,24], as well as to such advanced applications as mathematical modeling [23], knowledge bases [11], and artificial intelligence [6,25]. Over the years, the MKIS has persisted as a concept of how the computer can be applied to support one of the firm's functional areas. The success that firms have enjoyed in applying the concept should be credited in no small degree to the sound theoretical base provided by the early model builders.

The marketers' success has also served as a stimulus for similar activities in the other major functional areas. The manufacturing area has always been a strong computer user, both as a conceptual information system and as a component in the physical system that performs the production processes. However, manufacturing failed to label their system an "information system," electing instead to adopt the acronyms MRP (first meaning material requirements planning and then manufacturing resource planning and CIM (computer integrated manufacturing [4], and now ERP (enterprise resources planning). Likewise, in the financial area, the term "financial information system" was never really embraced, but considerable attention has been given to a subset of financial activity called the "accounting information system" [3]. The most recent effort to develop functional information systems has come in the human resources area in the form of the human resources information system (HRIS) or human resources management system (HRMS) [16]. All of these functional information systems reflect the intent of each area to ensure the availability of information to be used in understanding and managing its own operations. The systems usually involve the joint efforts of both the functional areas and the firm's information services (IS) unit.

The MKIS has been known to improve the efficiency and effectiveness of a firm's operations and create its competitive advantage [13–15]. Therefore, having a successful MKIS is vital to a firm for competing in today's global marketplace. The purpose of this study is to survey *Fortune* 500 firms in order to

understand the current status of MKIS usage in large businesses. The findings of this study will be compared to those of previous similar studies. This will shed light on the evolutionary nature of MKIS usage in *Fortune* 500 firms.

## 2. Research method

### 2.1. Subjects

The subjects in this study consisted of managers of marketing research in *Fortune* 500 companies listed in the April 1999 issue of *Fortune* magazine. This particular audience is preferred because the firms are generally leaders in technology application, and the managers are knowledgeable of the firms' marketing-related computer applications. A four-page questionnaire was sent to the subjects. Six weeks later, 37 usable questionnaires were received and the questionnaire was sent to non-respondents. After six more weeks, the data collection process was concluded. Fourteen usable questionnaires were received from the second wave of mailing, giving a total of 51 respondents and 10% response rate. Such a low response rate may be due to that the subjects may be unwilling to respond to unsolicited survey, and that many more companies set a policy of rejecting survey questionnaires. In our previous survey studies, we only received two or three rejection letters. Surprisingly, in this study, 24 companies had sent us the letters indicating their company policies. It is apparent that compared to the previous studies many more companies did not bother to respond. Tables 1 and 2 show the distributions of company types and size of the survey population and sample.

### 2.2. Questionnaire

The questionnaire used in this study is a modification of one developed by McLeod and Rogers for the initial study [18] and updated for the two subsequent projects [17,15]. For this study, additional questions were added to provide information concerning topics that are currently receiving attention by system designers and users. These topics include electronic commerce, the Internet, end-user computing, and object-oriented programming. The questionnaire

Table 1  
Industry sectors of respondents' companies

Industry sector	Survey population	Company has MKIS?	
		No	Yes
<b>Product-related industries</b>			
Aerospace	8	0	0
Apparel	2	0	0
Beverages	4	0	0
Building materials, glass	6	1	0
Chemicals	17	3	0
Computers, office equipment	13	0	3
Electronics, electrical equipment	20	0	0
Engineering, construction	7	1	1
Food	19	0	1
Forest and paper products	18	1	3
Industrial and farm equipment	12	0	1
Metal products	9	0	1
Metals	9	2	1
Mining, crude-oil production	2	0	0
Motor vehicles and parts	13	0	1
Petroleum refining	20	1	0
Pharmaceuticals	10	0	0
Publishing, printing	7	0	0
Rubber and plastic products	2	0	0
Scientific, photo., control equipment	6	1	0
Soaps, cosmetics	5	0	0
Textiles	1	0	0
Tobacco	3	0	0
Toys, sporting goods	2	1	0
Transportation equipment	1	0	0
Subtotal	216	11	12
<b>Service-related industries</b>			
Airlines	8	0	2
Brokerage	5	0	0
Commercial banks	31	0	2
Computer and data services	8	0	1
Diversified financials	11	0	0
Electric and gas utilities	34	1	4
Entertainment	4	0	0
Food and drug stores	23	0	2
Food services	4	0	0
General merchandisers	13	0	0
Health care	11	0	1
Hotels, casinos, resorts	2	0	0
Ins: life & health (mutual)	13	0	1
Ins: life & health (stock)	11	1	1
Ins: prop. & casualty (mutual)	2	0	0
Ins: prop. & casualty (stock)	16	1	2
Mail, package and freight delivery	3	1	1
Marine services	1	0	0
Pipelines	5	0	0
Railroads	6	0	1
Savings institutions	3	0	0
Specialist retailers	20	0	1

Table 1 (Continued)

Industry sector	Survey population	Company has MKIS?	
		No	Yes
Telecommunications	15	0	1
Temporary help	4	0	1
Truck leasing	1	0	0
Trucking	3	1	0
Waste management	2	0	0
Wholesalers	25	1	1
Subtotal	284	6	22
Grand total	500	17	34

was divided into two sections. The first section contained general questions regarding the computer and networking support. The second section contained specific questions relating to the MKIS support. At the end of the first section, the respondent was asked to indicate if his or her company has a marketing information system. Only those who indicated "Yes" to this question continued responding to the questions in the second section. This questionnaire was pretested several times to improve its format and wording before it was finalized.

Table 2  
Size of respondents' companies

Size of company	Survey population	Company has MKIS?	
		No	Yes
<b>Number of employees</b>			
894–4999	42	1	2
5000–9999	71	2	5
10000–24999	153	9	12
25000–49999	131	4	7
50000–709000	103	1	8
Total	500	17	34
<b>Annual sales</b>			
2.4 billion to below 3 billion	86	4	2
3 billion to below 10 billion	285	11	22
10 billion to below 25 billion	104	0	8
25 billion to below 50 billion	15	2	1
50 billion to 169 billion	10	0	1
Total	500	17	34

### 2.3. *Data representativeness*

Before the data analysis, the data representativeness of the sample was examined. First, the distributions of company types and size of the respondents were tested against the entire population. Then, those respondents having MKISs were also tested against the entire population. No significant difference was found in any distribution at the 0.05 level according to chi-square test of independence. This indicates that both groups should be representative of the entire population. Furthermore, a chi-square test (for nominal or ordinal scale) or Mann–Whitney test (for ratio or percentage scale) was conducted on each survey question between the respondents from the two waves of mailing. This allows us to identify the existence of non-response bias. No significant difference at the 0.05 level was found on respondents' perceptions of MKISs between the two groups, indicating the absence of non-response bias and allowing us to merge the two groups of questionnaires for further analyses.

## 3. Results and discussion

### 3.1. *Strategic planning in the responding firms*

As would be expected from the population, the responding firms are heavily committed to strategic planning and the incorporation of information resources into those plans. Formal, written business plans provide long-term guidance in 92% of the firms, and 76.2% of the plans specifically incorporate descriptions of the role played by the firms' information resources (hardware, software, information specialists, and so on). In addition, 82.4% of the responding firms indicate the availability of formal, written marketing plans, 95.2% of which include the utilization of information resources (percentages do not always add to 1.00 due to non-response or rounding).

Therefore, the majority of firms know where they want to go and how the computer may assist them. However, the responding marketing managers feel that there is still room for improvement in computer use. On a scale of 1–6 (with 1 being “very poor” and 6 being “outstanding”), the respondents assigned a value of 4.46 (between “good” and “very good”)

to their information resources in comparison to those of their competitors.

### 3.2. *Basic system characteristics*

In addition to using the computer as a strategic tool, many of the firms have developed marketing information systems. The questionnaire defined an MKIS as a computer-based system developed specifically to process and provide marketing information. Sixty-seven percent of the respondents reported that their firms have such systems.

This number is down from the 75% reported in 1990 [15] and could reflect a reduced computer use in marketing. However, such is not the case since 96% of the reporting managers indicated that they have a computer available and 88% of that group use their computer daily. Rather, the reduction in MKISs would appear to reflect a changed perception on the part of many of the respondents in recognizing a formal subset of the firm's computer-based information system as being dedicated to marketing activity. During the earlier years of computer use when there was no guarantee of adequate support from the firms' information services (IS) unit, the availability of something labeled an MKIS could have offered a degree of security. But, in today's environment of proven IS support and sophisticated users who can do much of their own computing, there is less need to label something as their own. Today's users are likely more concerned about how the computer technology can be used than what it is called.

### 3.3. *The MKIS framework*

Fig. 1 illustrates a framework of an MKIS adapted from Li et al. [15]. Three input subsystems gather data and information from the firm's operations and its environment, and enter them into the database. The database contents are made available to five output subsystems that have a processing capability of transforming the data into information for the marketing managers.

### 3.4. *Computer usage*

The value of the MKIS model is that it identifies the necessary components and shows how they are

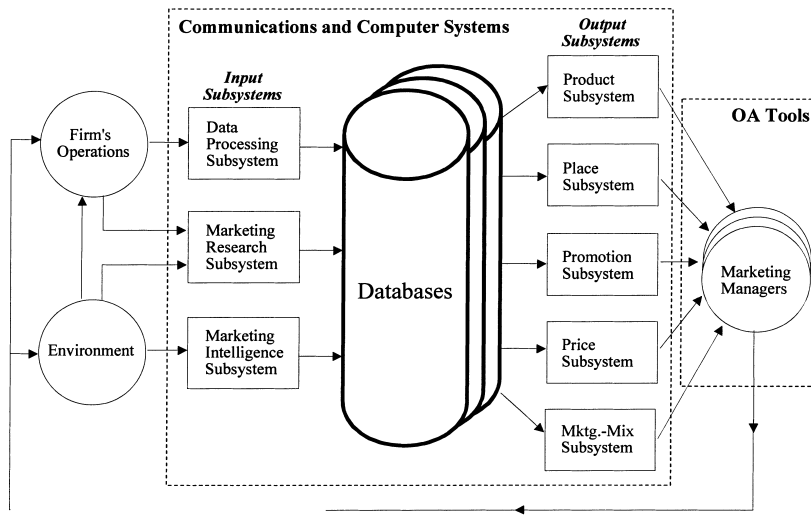


Fig. 1. The framework of a marketing information system.

interrelated, regardless of the particular computing technology used. In today's firms, various combinations of large computers called mainframes, centralized computers called servers, and workstations in the form of personal computers (PCs) and terminals can be found. Of the 96% of the managers who reported availability of a computer, 94% have available a networked PC, 12% a standalone PC, 12% a laptop, and 4% a terminal (some of the managers have more than one computer). The networked computers offer an ability to exchange information with other computer systems, such as the firm's mainframe or computers

located in branch and sales offices, and the laptops enable the managers to maintain a computing ability as they travel in the field. The small percent of terminals indicate a desire to perform computing functions on the user's own system rather than one located elsewhere. In most cases (92%), the managers have a computer in their office and 8% have access to one or more in their area.

Not only are the computer resources available, the marketing managers are using them more today than ever before. Fig. 2 shows how the frequency of computer use has increased during the 1980s and

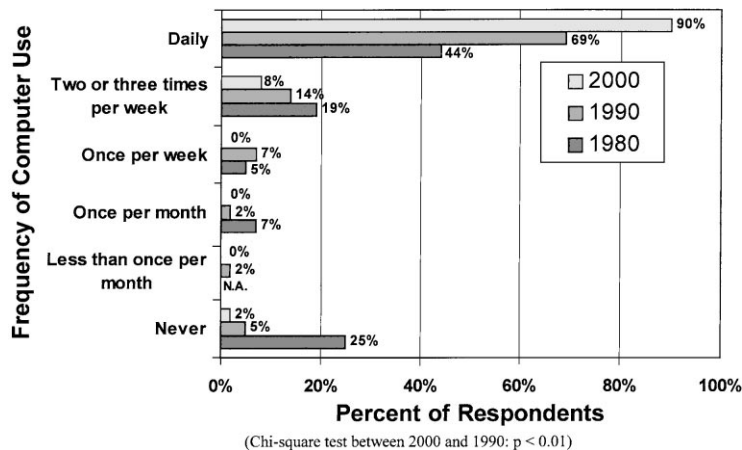


Fig. 2. Frequency of computer use.

Table 3  
Purpose of computer use (in %)

Purpose of computer use	2000 <sup>a</sup>	1990	1980
Communicating with people	88	– <sup>b</sup>	– <sup>b</sup>
Retrieving data	84	92	75
Word processing/publishing	80	– <sup>b</sup>	– <sup>b</sup>
Responding to inquiries	71	54	75
Sending/receiving reports	69	48	– <sup>b</sup>
Analyzing data	67	– <sup>b</sup>	– <sup>b</sup>
Producing reports	67	77	61
Storing data	63	64	56
Processing data	45	57	– <sup>b</sup>
Displaying graphic outputs	41	41	– <sup>b</sup>
Decision modeling/simulation	31	30	51
Conducting what-if analyses	29	– <sup>b</sup>	– <sup>b</sup>
Coding computer programs	6	14	40

<sup>a</sup> Chi-square test between 2000 and 1990 is not significant.

<sup>b</sup> Indicates the item was not used in the survey.

1990s. Unlike their predecessors, today's managers are using the computer either daily or two to three times a week, or they are not using it at all. There are no casual users.

The high incidence of computer availability and the high frequency of computer use paint a picture of marketing managers who have incorporated computer use into their daily activities. Table 3 lists the uses that the managers are making of their computer resources and includes comparative data for 1980 and 1990 when available. Most of the more popular applications do not represent complex uses, handling such relatively straightforward tasks as communication (88% of the respondents), storing data (63%), retrieving data (84%), performing word processing (80%), responding to inquiries (71%), and preparing reports (67%) and distributing them (69%). Data analysis, practiced by 67% of the respondents, is the only leading application that would involve the users in data manipulation.

Three of the computer applications that typically are associated with sophisticated computer use (graphics display, decision modeling and simulation, and what-if analyses) are pursued less frequently. These figures indicate a usage that takes more advantage of the computer's storage, retrieval, and communication ability rather than its computational ability. The figures for computer program coding offer stark proof of the steep decline in that activity by users during the past two decades.

The uses of the computer by the managers influence their perceptions of the MKIS. In most cases (29%), the managers view the MKIS as a "competitive weapon," followed by "different managers' information needs" (15%) and "reports" (12%). These perceptions focus on the computer's informational outputs and what they can accomplish. Next in line come perceptions of data files-storage (6%), retrieval (6%), and processing (6%). The three least popular perceptions are "understanding markets" (6%), "areas of marketing operations" (3%), and computer models and programs (3%). The managers clearly do not perceive the MKIS in terms of technology but, rather, what that technology can accomplish. This is akin to the classical advice given to sales representatives to "sell the sizzle, not the steak." The marketing managers are clearly more concerned with the "sizzle" of the MKIS than its "steak" content.

### 3.5. Data inputs

According to the MKIS model in Fig. 1, the three subsystems devoted to gathering data and information for entry into the database include data processing, marketing research, and marketing intelligence. The data processing subsystem is the firm's accounting information system, and has traditionally provided the bulk of a firm's computer input by recording each and every important action and transaction in a quantitative manner. The marketing research subsystem consists of those efforts to gather data by means of special studies, often surveys of customers and prospects. The marketing intelligence subsystem includes efforts to obtain information by ethical means that describes such elements in the firm's environment as the firm's competitors and the government.

Fig. 3 shows the relative proportions of these three input subsystems over time. Data processing continues to provide most of the input volume. For the three time-periods shown, data processing has continually increased at the expense of marketing intelligence and research. Two comments concerning these data gathering system seem appropriate. First, although marketing research is commonly recognized as an important marketing activity, marketing intelligence, which is given much less recognition, actually provides more data. Second, the MKIS relies primarily on the firm's accounting system for inputs. A symbiotic

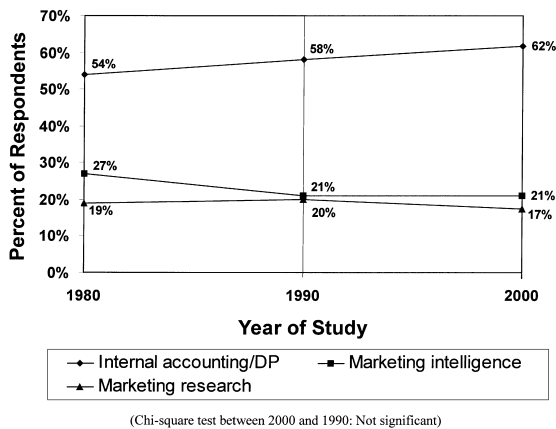


Fig. 3. Sources of input data.

relationship exists between marketing and accounting; the MKIS cannot exist without accounting data.

### 3.6. The database

Exactly what data is entered into the database from the input subsystems? Table 4 shows the data that is maintained in a computer and non computer form, and also that which is not maintained. As would be expected, all of the firms maintain customer data and in 97% of the cases the data is stored in the computer. Rather surprisingly, next in line is supplier data, maintained by 87% of the firms — 77% of the time in a computerized form. The high ranking of supplier data indicates that the marketers are not solely

interested in the sales side of the business, but also recognize the important of suppliers to marketing success. The attention given to prospects (computerized 71% of the time), competitors (68%) and the various governments and economies indicates the primary interest in the marketplace and those factors influencing it.

In addition to its focus on computer-based data, Table 4 also tells the story that in many of these large companies, such important data is maintained outside the computer, or is not maintained at all. Considering the fact that the *Fortune* 500 companies are usually global in nature, it is surprising that so many are not maintaining data on global governments (45%) and the global economy (40%). The MKIS as a global weapon still obviously has a long way to go.

There is another interesting statistic in Table 4, and that is the very low number of firms that do not maintain competitor data — 3%, second only to 0% for customer data. The marketers obviously recognize the importance of staying up to date on their competitors and their activities. Where does this competitor data come from? Table 5 shows that it is provided most often by the established marketing research unit (71%), but it also shows that it is next most often provided by a newcomer as an information source — the Internet (68%). The Internet has zoomed toward the top as an effective vehicle for monitoring competitor activity. The 18% of the firms using the Internet to gather data but not maintaining it in the computer deserve some explanation. Quite probably,

Table 4  
Maintenance of environmental data (in %)

Type of data	Maintained in computer	Maintained but not computerized	Not maintained
Existing customers	97	3	0
Suppliers	77	10	13
Prospects	71	16	13
Competitors	68	29	3
Federal government	63	19	19
Local government	54	27	19
State government	54	27	19
National economy	42	33	25
Local economy	32	32	36
State economy	26	39	35
Global economy	20	40	40
Foreign governments	18	36	45



Table 5  
Sources of competitor information (in %)

Source of information	Utilized and computerized	Utilized but not computerized	Not utilized
Marketing research	71	18	11
The World Wide Web, Internet	68	18	15
Commercial computer databases	62	0	38
Information provided by customers	50	32	18
Clipping services	32	32	36
Newspapers/magazines	29	47	24
Competitor's annual report	18	53	29
Competitor's other publications	18	50	32
Business associations	12	50	38
Trade shows	12	38	50
Competitor's sales reports	12	18	71
Competitor's sales call reports	6	9	85
Other	9	0	91

the information is gleaned from the Internet and produced in a hardcopy form for use and dissemination throughout the company.

The important role played by commercial databases (62%) should also be recognized. They are supplemented by a variety of other, more traditional sources such as clipping services (32%, up from 9% in 1990) and competitor annual reports (18%, up from 10% in 1990).

Fig. 4 shows how the computerization of gathered environmental data has fluctuated over time. The dominant customer data is likely provided largely by the data processing subsystem, using data captured from sales. The other data on competitors, prospects, governments, and the national economy are likely

gathered by the marketing research and intelligence subsystems. It is important to note that the computerization of each type of data nowadays enjoys a significant increase over 1990. This is probably due to the advent of World Wide Web making voluminous data accessible electronically through the Internet. These data, subsequently, can be electronically transferred into the database.

When asked whether the firm has a formal function with the responsibility for gathering environmental data, 91% of the firms indicated that such is the situation concerning customer data. Less often do the firms have units assigned to gather prospect data (65%) and competitor data (65%). Although not available from the responses, it would seem reasonable that these functions fall within the marketing organization. Other functions reported could fall in other organizational areas—supplier data (56%) could be the responsibility of the manufacturing unit, whereas government data (35%) and economic data (24%) could be a finance responsibility. All of these figures are impressive; they indicate a recognition of the importance of gathering and maintaining environmental data and evidence the commitment of the firms by assigning that responsibility to specific organizational units.

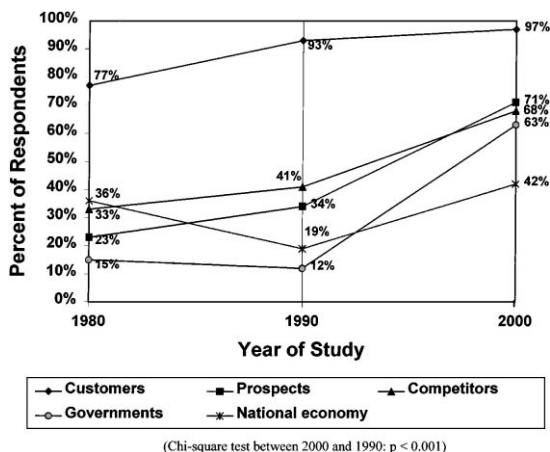


Fig. 4. Trend in computerization of environmental data.

### 3.7. Information outputs

The database contents are transformed into information for the marketing managers by the output subsystems illustrated in the MKIS model. There

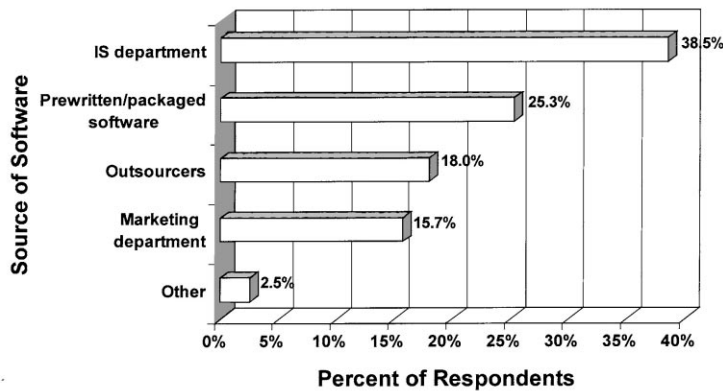


Fig. 5. Sources of MKIS software.

are five of these subsystems — four representing the classical marketing Four P's — product, place, promotion, and price, and the fifth representing an ability to integrate the P's into a composite marketing strategy. The idea of using the Four P's as an MKIS structure was first accomplished by Brien and Stafford [2].

The output subsystems consist of such software as report writers, database query languages, and programs written using modeling languages. Who provides this software? According to Fig. 5, the firm's IS unit is the primary provider, with 38.5% of the volume. The IS software most likely comes primarily in the form of custom-prepared programs. The next most frequent source is prewritten packages obtained from software vendors (25.3%). Outsourcers account for a significant portion (18.0%), and marketing provides a substantial amount (15.7%), produced by its own information specialists. Other sources account for 2.5%.

The trend to end-user computing, where users do some or all of their own computing, has resulted in the location of information specialists throughout the firm rather than being concentrated in IS, and this evolution has occurred in marketing. The marketing managers report that systems analysts are members of the marketing unit in 59% of the firms, DBAs (database administrators) in 56%, programmers in 50%, and network specialists in 38%. The marketing information specialists include no operators, indicating that marketing is developing systems but the operations of running the systems are being performed elsewhere,

likely in IS. The numbers and types of information specialists in marketing is impressive, indicating a definite ability to meet a large portion of the information needs of the marketing managers without relying completely on IS.

Table 6 provides a breakdown of the types of software used in the MKIS. Database management systems (DBMSs) represent the most popular software (17%). They are used by computers of all sizes and can, therefore, be located on mainframes, servers, and PCs. The electronic spreadsheets (13%) and word processors (11%) are typically used with PCs. The conventional programming languages at 12%, 4GLs

Table 6  
Software used in the MKIS

Type of software	Percent of use
Database management	17
Electronic spreadsheets	13
Conventional programming	12
Word processing	11
Statistical analysis	10
Graphics	6
Fourth-generation/integrated tools	5
Object-oriented programming	4
Desktop publishing	4
Artificial intelligence modeling	3
Decision modeling	3
Data communications	2
System simulation	1
CASE tools	1
Other	8

(fourth-generation languages) at 5%, and object-oriented languages at 4% are those that are typically used by both IS and marketing information specialists to prepare custom software to be used on larger computers. Three other categories of software most often are found in a prewritten form. They include statistical analysis packages (10%), graphics packages (6%), and desktop publishing packages (4%). The statistics and graphics packages, along with decision modeling software (3%) and simulation software (1%) are often identified with decision support systems, enabling managers to make decisions to solve problems that lack definite structure. CASE tools at 1% are used to develop systems, typically by IS personnel.

The impact that PCs have had on marketing computing can be seen in the DBMSs, spreadsheets, and word processors, and to a lesser extent the statistics, graphics, and desktop software. As indicated earlier with the recognition of the high incidence of PC use, much marketing computing is being performed on PCs.

### 3.8. Support provided by the MKIS

From its inception, the central theme of the management information system (MIS) concept has been the providing of information to managers to facilitate decision making, and that was the driving force behind initial MKIS efforts. Kotler, in describing his marketing nerve center in 1966, identified the manager's need for "...computer programs, which will enhance his power to make decisions" [10]. The managers were asked to provide information describing this support in terms of management levels, management functions, the marketing mix, and mathematical modeling.

#### 3.8.1. Support for management levels

The computer has been most successful in helping managers solve repetitive problems that contain elements that can most easily be quantified. Such problems are most often found on lower management levels and encourage computer use by those managers. However, problems solved at the higher levels typically are of greatest importance and receive the most support. Another influencing factor is the particular manager's computer literacy, which was a scarce commodity among senior managers during the earlier years of computing. Because of these influences,

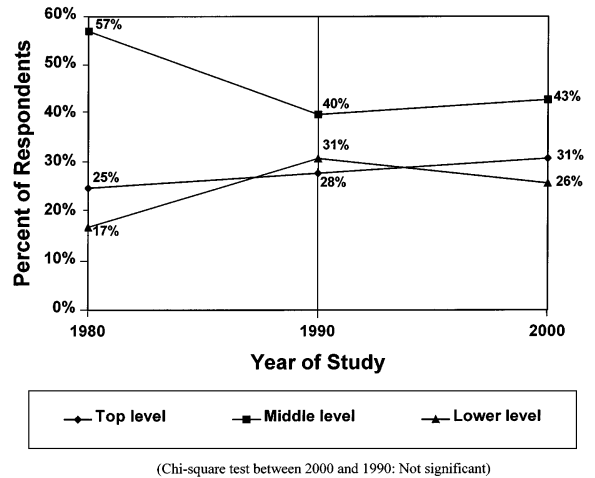


Fig. 6. Support for marketing management levels.

computer use has varied by management level as illustrated in Fig. 6. The managers were asked to indicate the relative support for the levels, with overall support being 100%.

Managers on the middle level have consistently received the most support, most likely because the planning and control problems that they face are within a 1–5 year horizon and easily become top-priority projects. Managers on the top and lower levels have consistently received less support, perhaps due to the difficulty of solving strategic planning problems on the top level and solving problems related to human resource management on the lower levels. Although there has been no clear-cut trend on the lower level, the top level has enjoyed consistently increasing support. Managers on the top level have received much attention during the past decade in the form of executive information systems (EISs).

Fig. 6 illustrates how the MKIS, originally geared primarily to the needs of middle-level managers, has provided more balanced support during the 1990s.

#### 3.8.2. Support for management functions

The effectiveness of the MKIS can also be measured in terms of how well it supports the jobs that the managers do. Management theorist Henry Fayol used the term management function to describe these jobs and concluded that they are all performed by all managers. Fig. 7 shows how the MKIS has supported the management functions of planning, organizing,

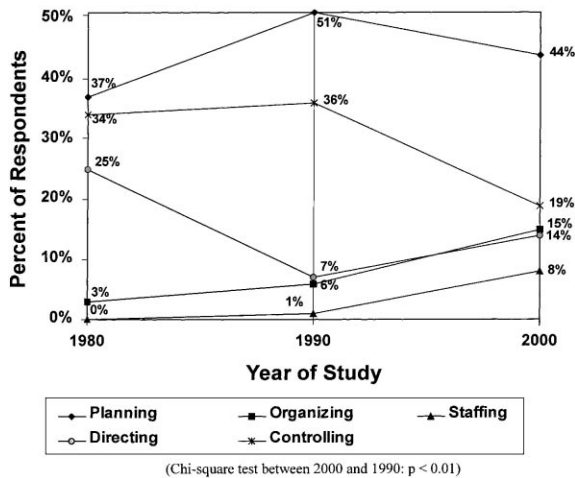


Fig. 7. Support for management functions.

staffing, directing, and controlling. Traditionally, the strongest support has been provided for planning and controlling and this can be seen in the figure. The other functions are more closely related to human resource management and have not been easy to computerize, although the levels of support all increased today. The surprising statistic in the figure is the dramatic drop in the proportion of support provided for controlling. Such support is easily achieved in the form of management reports that compare actual performance with a quota or budget. Perhaps so much recent system developmental effort have been aimed at staffing, organizing, and directing that it has come at the cost of support for the middle and top levels. Today's marketing managers appear to be using the MKIS primarily as a planning tool, with relatively balanced support for the other functions.

### 3.8.3. Support for marketing mix decisions

Although the support for the management levels and functions has reflected gradual change, the pattern for the marketing mix decisions has fluctuated. Fig. 8 reflects how support for the product and place decisions have been fairly stable but that for price and promotion has fluctuated widely. Price decisions can be difficult since they are influenced greatly by the vagaries of customer demand. Promotion decisions fall in the same category because they must solve problems of personal selling and advertising, both of which can be difficult to computerize. The 1990

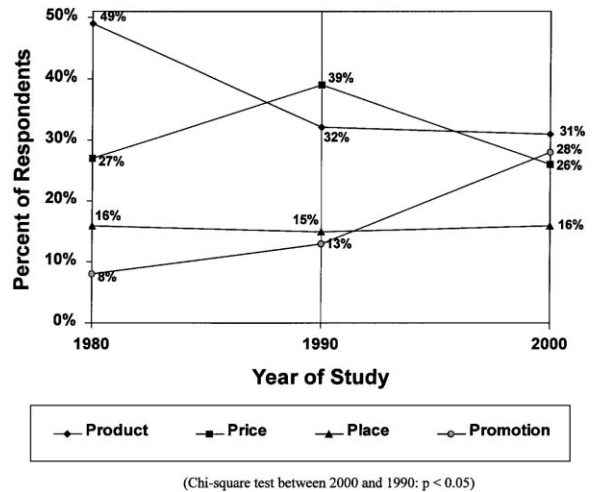


Fig. 8. Support for the marketing mix.

managers reported considerable improvement in the support for pricing decisions — an increase to 39%, putting it in first place. However, today's managers relegated pricing to third position at 26%. A change in the opposite direction can be seen for promotion, sending it from last place at 13% in 1990 to second position at 28% today. Whereas the support for product and place remain fairly steady, marketing managers appear to be shifting priorities for price and promotion, perhaps to meet changing needs of the marketplace.

One feature of the marketing mix analysis has stood out in each study, and that is the relative lack of support shown to place decisions. They have consistently remained at the 13–16% level and that is difficult to understand because they should easily lend themselves to the computer since they are problems of storage and distribution that are easily quantified. The managers appear to be content to give that ingredient the least support. Overall speaking, we are glad to see that the support for the marketing mix decisions has become more balanced today.

### 3.8.4. Mathematical modeling

Another measure of the support provided by the MKIS is how well it supports mathematical modeling. Table 7 indicates that new product evaluation and sales/demand forecasting are the two most frequently used models, and that analyzing sales profit and sales/demand forecasting receive most of the MKIS support.

Table 7  
Decision model use

Type of model	Percent using the model	Level of MKIS support
New product evaluation	59	2.86
Forecasting demand or sales	59	3.43
Product deletion	53	3.00
Pricing strategy	53	3.35
Analyzing sales profit	53	3.80
Promotion strategy	50	3.09
Computing operating budgets	47	3.33
Selecting advertising media	41	2.68
Assigning sales representatives to territories	41	3.07
Approving customer credit	38	2.62
Location of facilities (e.g. warehouses or stores)	35	3.00
Routing of salesperson or deliveries	24	2.90
Computing economic order quantities (EOQ)	24	3.00
Computing reorder points	24	3.17

Such modeling application has always captured the interest of management scientists and information specialists since it provides managers with a certain predictive ability. However, it can be difficult to achieve, especially when custom software is required. When electronic spreadsheets can be used, the models are not so difficult to build. According to Fig. 9, mathematical modeling was initially the bailiwick of the middle-level managers but, over the years, usage has become more balanced. Today, half of the model use is occurring at the middle level with the remainder equally balanced between the top and

lower levels. Current usage indicates that a modeling capability can be found on any level and that computer use by marketing managers can go beyond simple transformation and communication.

#### 4. The MKIS as a corporate information resource

The MKIS has never been an alternative to a firm-wide computer-based information system but must interact with similar systems throughout the firm. This symbiotic relationship was illustrated earlier by recognizing the importance of accounting data as an MKIS input. The MKIS exists within an organizational framework.

##### 4.1. Information resources management

The firm's overall approach to managing and controlling its computing resources has been termed information resources management, or IRM [12]. The blueprint for IRM comes in the form of a strategic plan for information resources (SPIR) [8]. The SPIR ideally is a joint effort involving executives from throughout the firm, with the firm's chief information officer (CIO) typically taking the leading role. Seventy percent of the *Fortune* 500 firms today are using such an SPIR.

The relationship between the SPIR and the activities of the firm's functional areas should be a reciprocal one; the areas should consider the availability

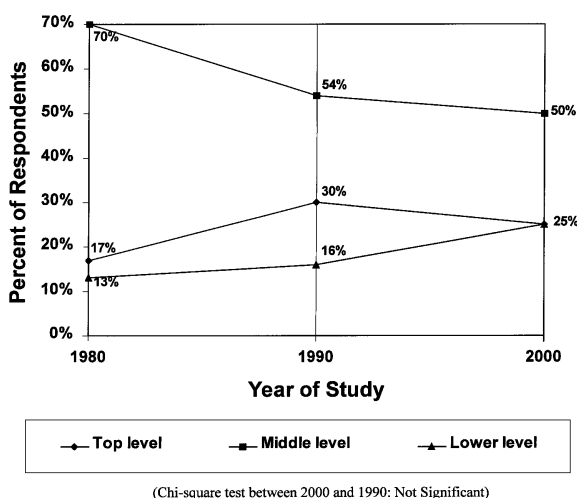


Fig. 9. Model use by marketing management levels.

of the firm's information resources when developing their strategic plans, and the mix of resources should be adequate to support the areas. When asked about this reciprocal relationship, the managers indicated that the SPIR has only "some" (3.54 on a 6-point scale with 1 meaning "not at all" and 6 meaning "extremely") influence on the firm's marketing strategies. However, the managers believed that the marketing strategies have "much" to "very much" influence on the SPIR with a 4.72 rating.

These figures indicate that the managers perceive marketing to occupy a position of relative power in the organization in terms of computer use with marketing generally calling the shots. This is a logical position since marketing determines products and services that the firm offers and then delivers that offering to customers. Marketing should have a primary influence on everything the firm does, including its use of computing.

#### 4.2. Marketing and the IS unit

Although the firm's information resources still tend to be concentrated in its IS unit, the systems generally are regarded as belonging to the users. This support role played by IS can be seen in Fig. 10. The percentages in Fig. 10 illustrate how the managers currently perceive the location of responsibility for the MKIS. Most often (47% of the time) the responsibility is jointly held by IS and marketing. Very often (35%) the responsibility is entirely assumed by marketing but very seldom (12%) by IS. In 6% of the firms, other organizations have the responsibility, perhaps units inside the firm or outsourcers.

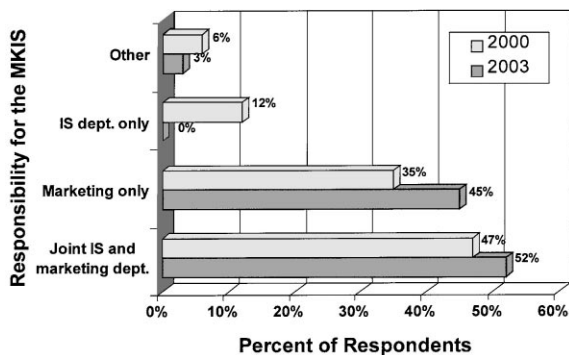


Fig. 10. Responsibility for the MKIS.

The interesting finding in Fig. 10 is the 2003 estimates depicting the situation 3 years in the future as perceived by the managers. In 97% of the firms, responsibility will be held either by marketing alone or marketing working in conjunction with IS. The incidence of responsibility by IS and other units will drop from 18 to 3%. Marketing anticipates taking greater charge of its computer operations, yet not forsaking the important synergistic relationship with IS. These perceptions by the marketing managers closely approximate those of CIOs concerning the future relationship between IS and users in general [19].

#### 4.3. Increasing reliance on electronics

Marketers are using information resources not only for computing but also for communications and delivering products and services to customers. As recognized earlier, communication represents the top computer use (see Table 3). Additional light is shed on this use in Fig. 11. The most popular ways of communication within the firm do not absolutely require the computer — FAX and phone (both 98%), and audio conferencing (86%). However, the remaining technologies are computer-based. Strong inroads are being made by e-mail (96%, up from 71% in 1990), video conferencing (77%, up from 9%), and computer conferencing (18%, up from 9%). The 47% level of use of the Internet for internal communications is testimony of the rapid impact of that technology. Also, more than half of the firms (57%) are communicating by means of electronic data interchange (EDI), by transmitting data and information directly from one organization's computer system to another.

In addition to increased levels of electronic communication, many of the firms are engaged in electronic commerce, accomplishing some or all of the sales process electronically. Of the responding firms, 81.6% are currently practicing electronic commerce, and 14.3% are aiming to do it in the future. Only 5% have not considered it. Electronic commerce is a reality in these large firms. In most cases (80.4%), the commerce consists of a home page on the Internet that can provide a variety of communications functions with prospects and customers. Also popular are EDI links with customers and suppliers (76.5%). Considerably less popular but by no means insignificant is the effort

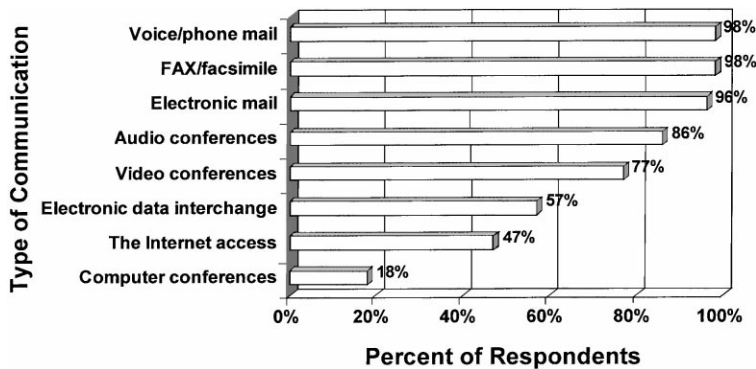


Fig. 11. Intra-firm communication technologies (among offices and branches).

of 27.5% of the firms to distribute their products and services on the Internet.

#### 4.4. The current performance of the MKIS

Just how satisfied are the marketing managers with the MKIS? On a 1–6 scale, the managers pegged their satisfaction at the 3.94 level, which is “somewhat satisfied.” Although at a high level, and higher than the 1990 average of 3.79, the managers see room for improvement. The managers are less critical when asked to evaluate how well the MKIS has enabled them to create a competitive advantage. Here, they assign an average value of 4.53, which would be between “much” and “very much.” This response is higher than reported in 1990 when 56% of the managers indicated a competitive advantage.

## 5. Conclusions and recommendations

Perhaps the single most important finding of the study is the fact that only 67% of the managers indicated that their firms have an MKIS, a level that is down considerably from the 75 to 77% of 1980–1990. This decrease would indicate that the MKIS is on its way out. However, other findings contradict this conclusion. The fact that 96% of the marketing managers have a computer available and 88% use it daily indicates that the computer is a vital part of marketing operations and management. In a corporate setting, computer used by marketing appears to be in a solid position. Formal marketing plans incorporate

information resources in 95.2% of the firms (compared to incorporation in 76.2% of the firms’ strategic business plans). And, the marketing managers’ perception that their strategies have a greater influence on their firms’ SPIR than the opposite further paint the picture of the marketing function dealing from a position of power when influencing computer use.

Another point that should be recognized is the dynamic and aggressive nature of marketing applications. Marketing is taking advantage of such new opportunities as the Internet. This is evidenced by the 81.6% of firms that are actively engaged in electronic commerce and the 27.5% that are distributing products and services electronically. Other examples include the communication technologies such as e-mail, video conferencing, computer conferencing, and the Intranet that have all enjoyed substantial increases in use during the 1990s. These advanced applications are all being developed in a setting where marketing is achieving an increased ability to control its own destiny within the corporate framework. Sizeable marketing staffs being information specialists (at least half of the firms have systems analysts, DBAs and programmers), combined with the projection that 3 years in the future no IS units will have sole responsibility for the MKIS, lead to the conclusion that marketing unit is in a commanding position to take care of its future information needs.

As time goes by, Internet access will be available to more and more marketers either in their offices or on the road. They will use Internet more frequently to capture the environmental information electronically. Data warehouses and data mining techniques will

become essential for marketers to fully utilize their internal data and environmental information. Given the increasing popularity of customer relationship marketing, computerization of customer data will become inevitable to every business. Every marketer should know more about information technology in order to take care his or her own information needs. As the global marketplace become more competitive and the marketing-mix factors become more complex, much more data must be digested in order to make a wiser decision. This calls for a more balanced support of MKIS for different management levels and marketing mix. Future marketers should use more decision models to analyze the alternate decision actions for their impacts on costs and profitability. Regardless of the label that is applied, marketing applications will continue to represent a vital portion of business computing in the years to come.

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