
Marketing Information Systems in Small Companies

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For the past few years, many small businesses in the U.S. have gone under and many others have downsized their operations. In order to survive, a small business must do its best to improve its competitive edge. To do so, one applaudable way is to establish and utilize the marketing information system (MKIS). The MKIS has been known to create competitive advantage for companies in various industries. This study surveys 1000 small U.S. companies to explore their overall status of MKIS usage. Generally speaking, small firms are not utilizing as much of the MKIS as the larger firms. They are not fully exploiting the latest information technologies to create competitive advantages. Many marketing managers in the firms are not satisfied with their MKISs. As the global market becomes increasingly competitive, it is vital to small firms to improve their MKIS usage in the near future. Otherwise, many of them are likely to go under in the next wave of economic recession.

Corporate America today is in an era of increasing globalization and competition. The recent recession of the U.S. economy has caused many small businesses to go under and forced many others to downsize their operations. In order to survive in today's business war games, firms must collect environmental information and increase their internal efficiencies and effectiveness. It has been reported that many firms across U.S. industries have been utilizing marketing information systems (MKISs) to do so. A marketing information system (MKIS) is the nerve center of marketing organizations in the U.S. It provides a marketing manager with the information about customer needs in the marketplace and identifies new or improved products and services to satisfy the customers. The manager must make many decisions from the time a need is recognized until the product or service appears on the market. The role of MKIS is to assist the manager in decision making activities and makes it possible for a firm to

react more quickly to the customer's needs. It allows the manager to follow up on how well the needs have been met. This feedback information is then used to modify, improve, or delete products and services which in turn increases the efficiency and effectiveness of the firm's operations and improve its competitive edge. Therefore, having a successful MKIS is vital to a firm in order to compete in today's global marketplace.

To gain a perspective on MKISs in the U.S., many researchers have surveyed different groups of companies during the past two decades. Boone and Kurtz (1971), McLeod and Rogers (1982), and Li, McLeod, and Rogers (1993) reported the status and progress of MKISs in Fortune 500 companies. McLeod and Rogers (1985) and Li (1995) disclosed the MKIS status of the top 1000 U.S. firms. Berry (1983) and Mentzer et al. (1987) revealed the use of microcomputers in the MKISs of U.S. firms. Higby and Farah (1991) reported the use of decision support and expert systems

Manuscript originally submitted July 11, 1995; Revised December 8, 1995; Accepted May 18, 1996 for publication.

in the MKISs of U.S. firms. Among all these studies, the ones described by McLeod and Rogers (1982,1985) and Li (1993,1995) are more theoretically sound and provide a more complete perspective of MKIS in a firm. However, their surveys have invariably focused on large U.S. companies. Neither of the other researchers has reported the MKIS status specifically for small businesses in the U.S.

Small businesses have been known to account for over 90% of all U.S. firms and almost half of the gross national revenue (Raymond, 1985). It is important for us to study their use of MKISs and the impact of MKISs on their marketing functions. This study surveys a sample of 1000 small companies across U.S. industries. The current status of small U.S. companies reported by this study can be used as a yardstick by a company of comparable size to measure against its MKIS operations. Strengths and weaknesses of the company's MKIS can then be identified. This may in turn provide the company management useful guidelines for formulating MKIS implementation strategies and identifying MKIS application portfolios.

Research Method

The subjects of this study were the marketing executives of the firms systematically selected from a recent version of the Standard & Poor's directory (Standard & Poor's Corporation, 1992). The sampling process first selects a firm randomly from the directory. If the firm's sales dollar is no more than 250 million and the number of employees is under 1500, it is kept in the sample. Otherwise, another firm is selected. This process was repeated until 1000 companies had been obtained. The sizes of the sampled firms were considerably smaller than those of Fortune 500 and Fortune 1000 firms as surveyed in the previous studies (McLeod and Rogers, 1982, 1985; Li, 1993, 1995). This allows us to contrast some differences in MKIS usage between small and large U.S. firms.

Once the mailing list of the sample was completed, a questionnaire adopted from Li (1995) for measuring the use of MKIS and a letter with instructions for completing the questionnaire were sent to the marketing executives of the sampled companies. Six weeks later, a second wave of mailing was sent to the non-respondents. After two months, a total of one hundred and fifty-three questionnaires were returned, giving us a 15% response rate. This response rate is typical of an unsolicited mail survey. It is somewhat higher than the range of 7% to 14% as reported by the other related studies (Berry, 1983; Higby and Farah, 1991; Li, 1995; Mentzer et al., 1987). Among the 153 respondents, 78 (51%) indicated their firms have some form of MKIS and were able to complete the entire questionnaire. These 78 questionnaires were completed by 41 respondents from the first-wave mailing and another 37 respondents from the second-wave one.

In order to examine the existence of non-response bias, a series of chi-square and 't' tests were then conducted between the samples with completed questionnaires from the two waves of mailing. No significant difference was found on any question on the questionnaire between the two samples, indicating there is no significant non-response bias. Therefore, these two samples were regarded as coming from the same population and merged as one for further analyses in this study.

All the 153 respondents are from for-profit organizations. Table 1 shows the distributions of industries in which the respondents' companies operate. Likewise, Table 2 reveals the distributions of sales dollars and number of employees. The sizes of sales ranged from 3 to 215 million dollars, while the sizes of employees ranged from 7 to 1,460 persons. Since those companies having no MKISs did not fill out the questionnaire, they were excluded from any further analysis. The following sections are based on the responses from the 78 companies having MKISs. The representativeness of the sample seems to exist since the respondents represent a wide range of companies in terms of industrial types and business sizes. The chi-square test was used to identify significant differences in the demographic distributions between the companies having MKISs and those having no MKISs. No significant difference (at the 0.05 level) was found in the distributions of industry type and employee size between the two groups of companies, indicating that the companies having MKISs should be as representative as the entire sample. This group of companies allows us to develop an MKIS status of small businesses in the U.S. as a whole.

Results and Discussion

Based on chi-square tests, the distributions of sales volume of the two groups of companies (having versus not having MKISs) were significantly different at the 0.05 level, suggesting that the less the firm's sales dollars, the higher the likelihood that it may not have an MKIS. The percentage (49%) of firms not having any MKIS is much higher than the 24% and 25% found in the top 1000 U.S. firms (McLeod and Rogers, 1985; Li, 1995). This is probably due to the fact that many small firms cannot afford to own and operate their own MKISs; they are more likely than large firms to outsource their MKISs, if they can afford to do so.

Integration of CIS and Marketing Plans

Many (73.7%) of the firms having MKISs also had company-wide CISs. Almost half (46.3%) of the firms having CISs had formal, written company-wide CIS plans. More than half (58.3%) of the CIS plans were influenced by their marketing strategies. On the other hand, many (67.5%) of them said they had formal, written marketing plans. However, not as many (48.1%) formal marketing plans were influenced by the

Type of Industry	Company has MKIS?		% of Row Total
	No	Yes	
<i>Product-related Non-manufacturing Industries:</i>			
Agricultural production—Crops	0	1	0.7%
Metal mining	1	0	0.7%
Coal mining	0	1	0.7%
Oil & gas extraction	2	0	1.3%
Building construction—General contractors & operative builders	2	0	1.3%
Heavy construction other than building construction—Contractors	1	0	0.7%
Construction (Special trade contractors)	3	1	2.6%
<i>Subtotal:</i>	9	3	7.8%
<i>Product-related Manufacturing Industries:</i>			
Food & kindred products	1	2	2.0%
Textile mill products	0	1	0.7%
Apparel & other fabric products	1	0	0.7%
Lumber & wood products, except furniture	1	1	1.3%
Furniture & fixtures	0	2	1.3%
Paper & allied products	1	1	1.3%
Printing, publishing & allied industries	3	1	2.6%
Chemicals & allied products	2	4	3.9%
Rubber & miscellaneous plastic products	2	2	2.6%
Leather & leather products	0	1	0.7%
Stone, clay, glass, & concrete products	3	1	2.6%
Primary metal industries	2	2	2.6%
Fabricated metal products, except machinery & transportation equipment	6	4	6.5%
Industrial & commercial machinery & computer equipment	6	10	10.5%
Electronic & electrical equipment & components except for computers	2	8	6.5%
Transportation equipment	1	3	2.6%
Measuring, analyzing & controlling instruments	0	2	1.3%
Miscellaneous manufacturing industries	3	1	2.6%
<i>Subtotal:</i>	34	46	52.3%
<i>Service Industries:</i>			
Motor freight transportation & warehousing	0	1	0.7%
Transportation services	0	1	0.7%
Communications	2	2	2.6%
Electric, gas & sanitary services	2	2	2.6%
Wholesale trade—Durable goods	5	6	7.2%
Wholesale trade—Nondurable goods	2	3	3.3%
Food stores	1	0	0.7%
Apparel & accessory stores	1	0	0.7%
Home furniture, furnishings & equipment stores	1	0	0.7%
Eating & drinking places	1	0	0.7%
Miscellaneous retail	0	2	1.3%
Depository institutions	3	1	2.6%
Nondepository credit institutions	1	0	0.7%
Security & commodity brokers, dealers, exchanges & services	3	0	2.0%
Insurance carriers	0	1	0.7%
Real estate	0	1	0.7%
Holding & other investment offices	1	0	0.7%
Hotels, rooming houses, camps & other lodging places	1	0	0.7%
Business services (including EDP)	5	4	5.9%
Miscellaneous repair services	0	1	0.7%
Amusement & recreation services	1	0	0.7%
Engineering, accounting, research, management & related services	2	4	3.9%
<i>Subtotal:</i>	32	29	39.9%
Total:	75	78	100.0%
(N = 153)			

Table 1: Industry Types of Respondents' Companies

Size of Company	Company has MKIS?		Row Total	% of Row Total
	No	Yes		
Annual Sales:				
\$ 10 million or less	22	14	36	23.5%
Over \$ 10 million to \$ 25 million	20	17	37	24.2%
Over \$ 25 million to \$ 50 million	18	16	34	22.2%
Over \$ 50 million to \$ 100 million	11	15	26	17.0%
Over \$ 100 million to 250 million	4	16	20	13.1%
<i>Column Total:</i>	75	78	153	100.0%
<i>% of Column Total:</i>	49.0%	51.0%	100.0%	
Number of Employees:				
100 or less	23	16	39	25.5%
Over 100 to 250	20	16	36	23.5%
Over 250 to 500	16	16	32	20.9%
Over 500 to 1,000	13	22	35	22.9%
Over 1,000 to 1,500	3	8	11	7.2%
<i>Column Total:</i>	75	78	153	100.0%
<i>% of Column Total:</i>	49.0%	51.0%	100.0%	

Table 2: Size of Respondents' Companies

firms' information-related resources. This 48.1% is not as low as what we expected to see though. Small businesses usually do not have as much information resources as large businesses have. Their information resources are not strong enough to be used as strategic weapons for business competition. However, given the continuous increase in computer power and dramatic decrease in its cost, small firms are expected to have more and more information resources and begin to incorporate them into their marketing strategies in the foreseeable future.

MKIS Hardware and Software

A majority (84.4%) of the respondents indicated that their MKISs were computer assisted. On average, 44% of the hardware used in a company's MKIS are mainframe computers, 25.1% are personal computers, 22.4% are minicomputers, and 8.5% are multi-user microcomputers. It was our expectation that supercomputers are too expensive for small companies to use, thus none of the respondents' firms were using them.

Regarding software usage, three categories of software have accounted for 82% of the usage in the MKIS. These included conventional programming (41%), database management (21.8%), and decision modeling and spreadsheets (19.1%). The other software such as statistical analysis programs (4.5%) and fourth generation languages (2.8%) were not used as much as expected. Logic programming (0.8%) and expert system shells (0.2%) as shown in Figure 1 were used even less frequently. These percentages were consistent with those reported by Higby and Farah (1991) in which logic programming accounted for 0.3% and expert systems for 0.2%. These percentages seem to reflect the heavy

usage (66%) of mainframes and minicomputers in these firms and the nature of marketing problems which is usually ill-structured. While mainframe usage requires tremendous effort in conventional programming, an ill-structured problem requires the use of database and decision software to retrieve and process vast amount of data for what-if analyses.

Perception Toward MKISs

Many marketing managers associated their marketing information systems with "reports" (34.6%), "data/file retrieval" (17.9%), or "different managers' information needs" (15.4%). The most popular definition of MKIS is "a group of subsystems (some gather data, and some process it). The data gathering subsystems are marketing research, marketing intel-

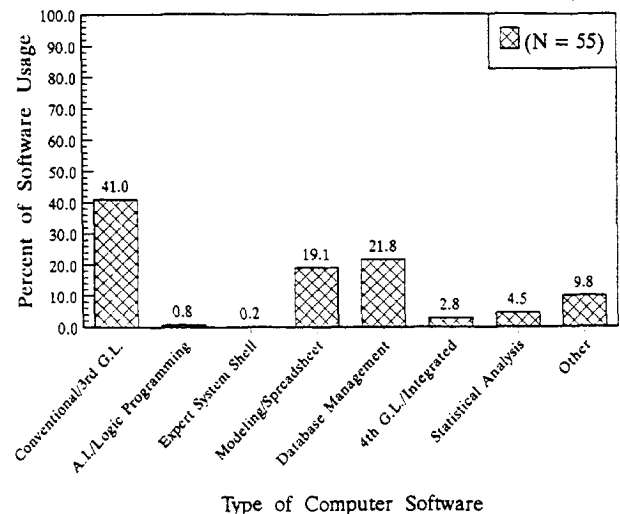


Figure 1: Computer Software Used for MKIS

ligence, and internal accounting/data processing. The processing subsystems produce information about the major marketing activities (product, price, distribution channels, and promotion.” This definition was concurred by 22.9% of the respondents. Although it is short, it seems to capture the essence of the MKIS model proposed by Li, McLeod, and Rogers (1993).

Computer and Terminal Usage

Most companies (84.6%) had personal computers (PCs) or terminals available to the marketing managers for their job functions. Figure 2 shows that many (71.2%) managers used PCs or terminals on a daily basis. Weekly users (18.2%) and monthly users (4.5%) are less common. Only a few managers (6%) have never used PCs or terminals even though the machines are available to them.

Similar to the other studies (McLeod and Rogers, 1982, 1985; Li, 1993, 1995), the majority (90.5%) of managers in these small firms indicated the use of computers for retrieving data. Producing reports (71.4%), processing data (58.7%),

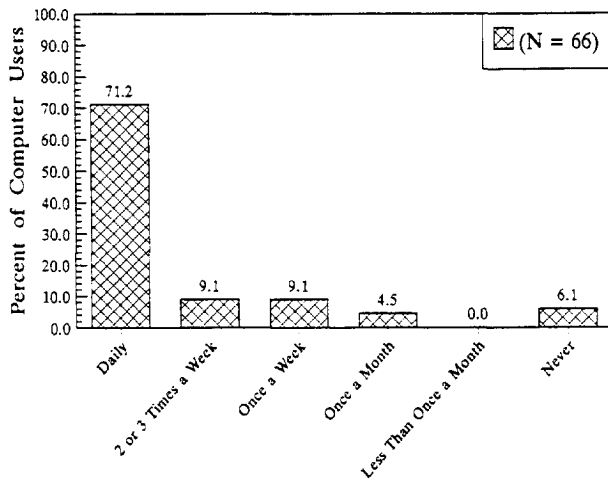


Figure 2: Frequency of Computer Usage

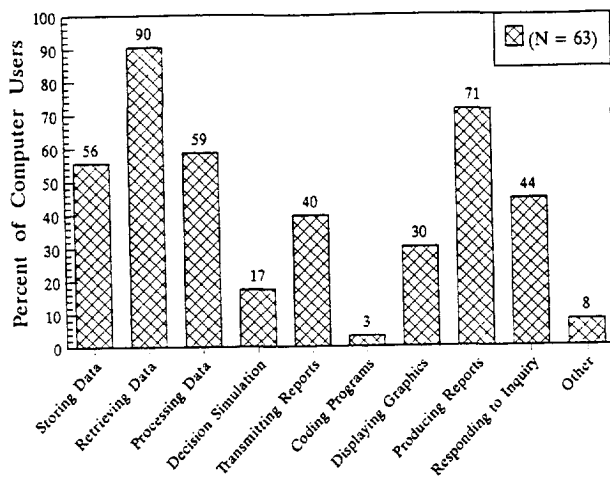


Figure 3: Purposes of Computer Usage

storing data (55.6%), responding to inquiries (44.4%), and transmitting reports (39.7%) followed in sequence as shown in Figure 3. Although conventional programming was the major purpose of MKIS software usage as identified earlier, very few marketing managers (3.2%) were actually involved in coding computer programs.

Regarding the use of computers to communicate between branches or offices, only a few firms were using electronic mail (38.5%) and electronic bulletin board (9%). Computer conferencing and video conferencing were very rare, probably due to the high costs of implementing them. None of the firms were exploiting the recent hyperdocument technology (Akscyn et al., 1988; Conklin, 1987; Haan et al., 1992; Nielsen, 1990), maybe for the same reason (high costs. However, these small firms were not alone. A recent survey of Fortune 500 firms (Li et al., 1993) also reported such lack of usage in the very large U.S. firms. Ironically, the latter group of firms is supposed to be on the forefront of exploiting new information technologies. Perhaps, this is because hyperdocument technology is still in an embryonic stage and the costs associated with its implementation is not justifiable even in a very large firm.

Sources and Contents of Information

There are three possible sources of information for an MKIS: internal accounting/data processing, marketing research, and marketing intelligence. Internal accounting/data processing function, which provides marketing managers with the data about the firm’s operations and its existing customers, was regarded as the most important source of MKIS information by 54.2% of the 72 respondents (see Figure 4). Marketing intelligence (31.9%) and marketing research (13.9%) functions followed in sequence but were not as much as expected. These two functions give the managers the data about potential customers, competitors, governments, and national economy. The average ranks of these three sources

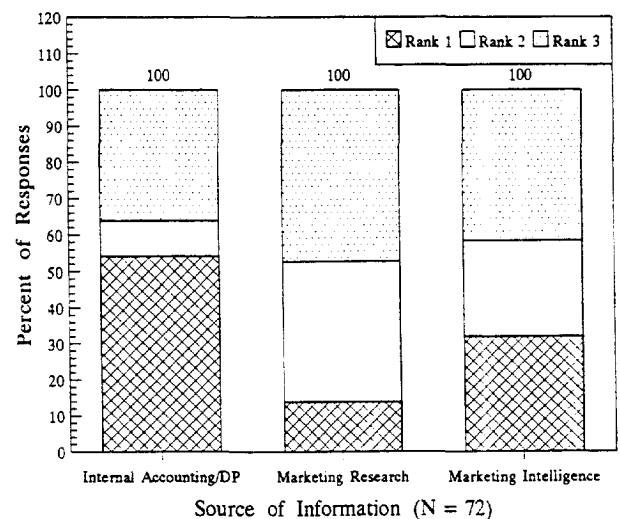


Figure 4: Sources of Information in MKIS

were also in such sequence: internal accounting/data processing (1.82), marketing intelligence (2.10), and marketing research (2.33). Many (76.7%) firms were routing marketing intelligence information to those managers with needs to know as soon as the information was available.

All the firms were maintaining data about existing customers. Many of them were also maintaining data about potential customers (66.7%) and competitors (62.8%). Only some firms were gathering data about governments (41%) and the national economy (25.6%). Most of the computerized databases in MKISs were storing data about existing customers (91%), followed by potential customers (46.2%), competitors (20.5%), and governments (12.8%). Almost no one (only 1.3%) has computerized data about national economy. Half of the firms did not have an office dedicated to collecting any of the above environmental information. The other half all had offices for collecting customer information. Some of these offices also were collecting information about competitors (50%) or governments (23.5%).

With respect to competitor information, the primary source was sales call reports (63.6%), followed by purchase reports (49.4%), corporate annual reports (41.6%), and clipping service (33.8%). Only a few companies had computerized their sales call reports (20.8%), purchase reports (19.5%), clipping service (2.6%), and corporate annual reports (1.3%). Regarding preprocessed information (such as sales forecasts, distribution trends, market shares, inventory statistics, etc.), many firms (63.6%) had them available to the managers on a real time basis. Some (34.2%) even had economic-trend estimates included in their marketing forecasts.

Support for Marketing Management

Top-level managers (such as vice presidents of marketing, sales, etc.) were regarded as the ones receiving the most support from MKISs by 64.2% of the respondents. Middle-level managers (such as regional managers, directors, etc.) took the second place (31.3%) as shown in Figure 5. Low-level operating managers (such as office managers, supervisors, etc.) were in the third place (14.9%). The average ranks of the three levels were 1.54, 1.82, and 2.61, respectively.

These managers were using MKISs mostly for their planning (51.7%) and controlling (26.5%) functions (see Figure 6). Only a few thought organizing (15%), directing (8.3%), and staffing (3.3%) were receiving the most MKIS support. The average ranks were 1.75 (planning), 2.98 (controlling), 3.27 (organizing), 3.48 (directing), and 4.5 (staffing).

Support for Marketing Decisions

There were many types of marketing decisions the responding managers were responsible for. The most common ones were the pricing strategy determination, new product evaluation, advertising media selection, and product deletion. The percentages of managers in charge of these decisions

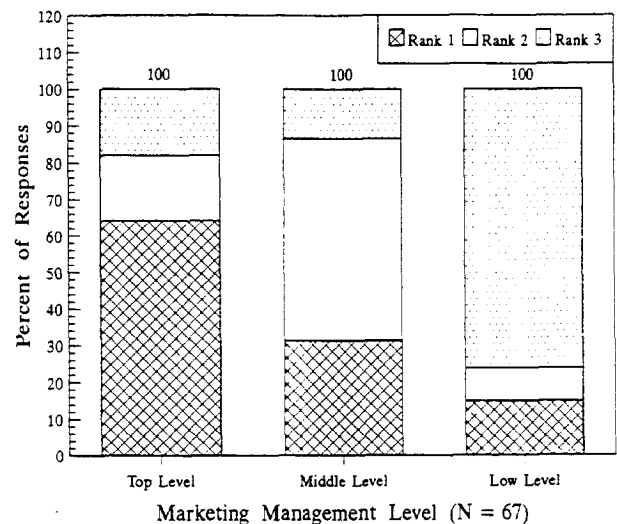


Figure 5: MKIS Support for Management Levels

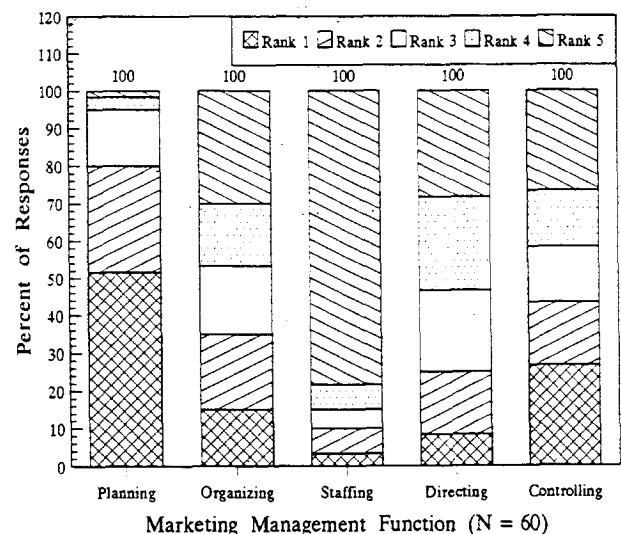
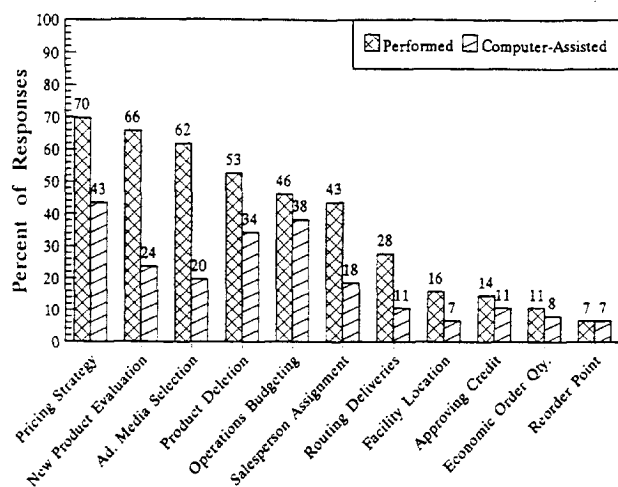


Figure 6: MKIS Support for Management Functions

respectively were 69.7%, 65.8%, 61.8%, and 52.6%. As displayed in Figure 7, operations budgeting (46.1%), salesperson assignment (43.4%), and routing deliveries (27.6%) were less common. Due to the natures of problems, the well-structured decisions such as operations budgeting, economic order quantity, reorder point, and approving credit were more likely to be computer-assisted than those ill-structured problems such as advertising media selection, new production evaluation, salesperson assignment, routing deliveries, pricing strategy, product deletion, and facility location (see Figure 7).

Most of the above decisions are related to the four marketing ingredients: product, place, price, and promotion. As shown in Figure 8, many (35.3%) managers thought that price-related decisions were receiving the most support from



Type of Decision Model (N = 76)

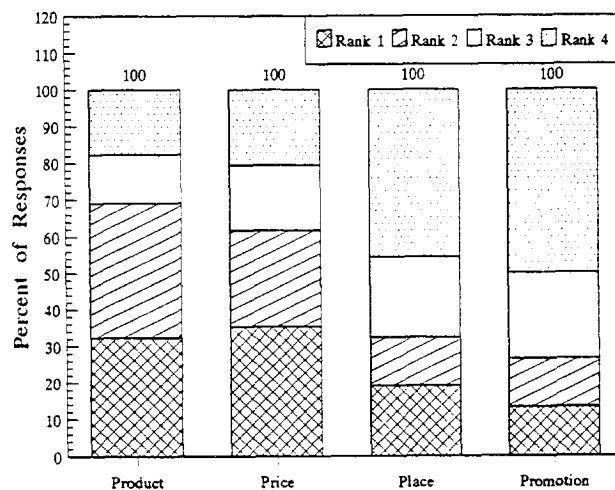
Figure 7: Marketing Decisions and Computer-Assisted Models

MKISs, followed by product-related (32.4%), place-related (19.1%), and promotion-related (13.2%) decisions. The average ranks of these supports were 2.16 (product), 2.24 (price), 2.94 (place), and 3.1 (promotion). Unfortunately, the descriptions of these marketing-mix decisions were not stored in a computerized database as much as expected. Only 49.3% of the companies had the descriptions of price-related decisions computerized, followed by product (31%), place (28.2%), and promotion (19.7%) related decisions. These percentages were not as high as the 27% to 56% of Fortune 500 firms (Li, et al., 1993), indicating that small firms are not computerizing as much as their large counterparts. This is probably because they usually do not have enough information resources to do what the large firms are doing in the area of automation.

In terms of management levels, many (61.5%) respondents indicated that the decision models for solving certain aforementioned decision problems were intended for use by a particular level of management. Figure 9 discloses that top-level managers were regarded as the most frequent users of decision models by 63.8% of respondents, followed by the middle-level (32.8%) and low-level (8.6%) managers. The average ranks of their use of decision models were 1.53, 1.93, 2.72, respectively. This is quite different from the Fortune 500 firms in which middle-level managers were the main users.

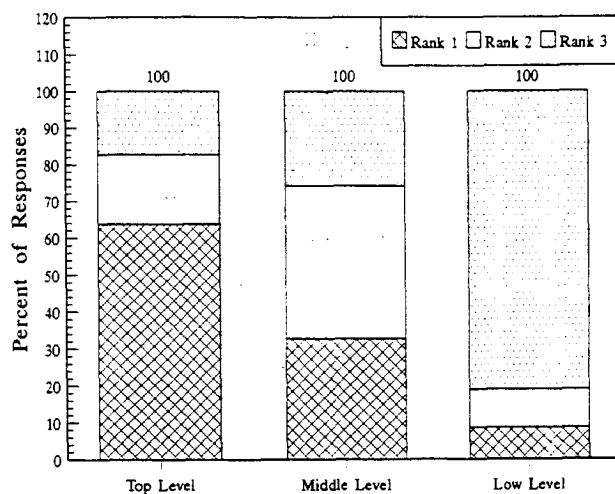
MKIS Satisfaction and Competitive Advantage

Recently, information systems have been used by many firms in the U.S. to create competitive advantages (Beath and Ives, 1986; Cash and Konsynski, 1985; Ives and Learmonth, 1984; Johnston and Vitale, 1988; McFarlan, 1984; Parsons, 1983; Porter and Millar, 1985). Since MKIS is a type of information system, it should be able to improve a firm's competitive edge if it is properly designed and managed. Our



Marketing-Mix Decisions (N = 68)

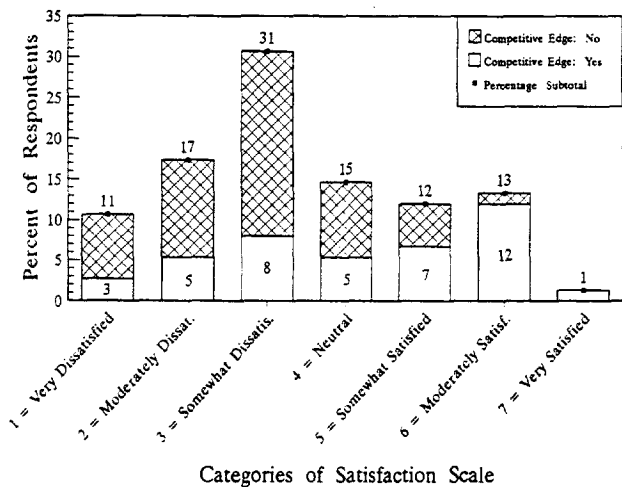
Figure 8: MKIS Support for Marketing-Mix Decisions



Marketing Management Level (N = 58)

Figure 9: Decision Models Used by Management Levels

data showed that only 41.3% of the managers felt that their MKISs had given them some competitive advantage. Nonetheless, many (58.7%) of them were not satisfied with their MKISs while some others (14.7%) were neutral about their systems. A cross-tabulation of satisfaction level by competitive advantage (see Figure 10) showed that there was a significant positive association ($p < 0.0153$) between the two factors. That is, the firms that have been the most successful in achieving competitive advantage appear to be the ones whose executives have the most positive perception of their MKISs. In this case, we may expect the MKISs which are perceived satisfactory by the users to be more likely to create competitive advantages for the firms than those which are perceived unsatisfactory. In other words, creating competitive advantages for the firm seems to be the key to the satisfaction of MKIS users. This is what future MKIS managers should be striving for.



N = 75, Grand Mean = 3.453, Grand Standard Deviation = 1.571

Figure 10: MKIS Satisfaction and Competitive Advantage

Conclusions

The results of this study reveal that small businesses in the U.S. are not using the MKISs as much as large businesses. While over 75% of large U.S. firms have MKISs, only 51% of small ones have the systems. However, many MKISs in small firms are computer-based. Their computing hardware tools are primarily mainframe computers. The situation that most of them have access to PCs and use them on a daily basis indicates the increasing popularity of end user computing. This is confirmed by the large share (25%) of PC usage in their MKISs. The major purpose of MKIS usage is to retrieve and process data so as to produce reports. It is done mainly through the use of conventional programming languages, database management systems, and spreadsheets or decision modeling programs.

Most small firms are not using computer networks to communicate between different branches and offices. Very few of them even use electronic mail or electronic bulletin board to communicate. Their primary communication tool is most likely the voice-mail working on the common telephone networks. Computer conferencing or video conferencing in these firms is almost nil.

Regarding the types of data available in the MKISs, many firms depend on their internal accounting/data processing function to generate internal data and customer data. Many of them also collect data about potential customers and competitors. The primary source of competitor information is sales call reports. As expected, the percentage of small firms having offices specialized in collecting environmental data is less than that of the Fortune 500 firms. The former is 50% and the latter 67% (Li et al., 1993). In contrast with large firms (Li et al., 1993; Li, 1995), much of the data in small firms is not

computerized. This must have an impact on their ability to fully use the available data.

The support of MKIS in small firms mainly goes to top-level managers for their planning purposes. They are also the major users of decision models in the firms. Middle-level and low-level managers seem under-supported. Most decision models are used to determine pricing strategies, evaluate new products, select advertising media, and delete unprofitable products. Therefore, decision support of MKISs mainly goes to price-related and product-related decisions. The support for place-related and promotion-related decisions seem inadequate. Moreover, the decision models and their descriptions are not computerized as much as in the large firms. This makes many small firms sluggish in making important marketing decisions.

It appears that many small firms have computer information systems for company-wide usage. However, only half of them are integrating their CIS plans with their marketing plans. Without the integration of these plans, the MKISs are less likely to create competitive advantages for the firms. This maybe the reason why many marketing managers are not completely satisfied with the quality of their MKISs. The future of MKISs in these small U.S. firms lies in how well the firms can improve the aforementioned shortcomings of their MKISs. One plausible action is to increase end-user computing and use more minicomputers and PCs in the MKISs. As the costs of hardware and software are dramatically decreasing, small firms should begin to adopt new information technologies, such as client-server networks (Pedersen, 1993) and hyperdocument processing (Akscyn et al., 1988; Conklin, 1987; Haan et al., 1992; Nielsen, 1990), to improve the communications between their branches and offices. More decision models and more environmental data should be computerized to improve the quality and timeliness of their marketing decisions. They must increase the MKIS support for middle and low level managers and for distributional and promotional decisions in order to strike the balance of MKIS support for all levels of management as well as for all types of marketing-mix decisions.

In summary, small firms, unlike large ones, do not usually have as many information resources as they need. Their MKISs are not as sophisticated as the large firms. Therefore, in a war of business against their large counterparts, small firms should not compete with the large firms head to head in the area of automation. They should take full advantage of what most large firms are lacking (flexibility in organizational process and effectiveness in organizational communications). It is these two unique organizational characteristics, not the sophistication of MKIS, that would give a small firm a chance of winning in the competitive global marketplace. Therefore, it is vital for all small firms to utilize more of their MKIS support to improve continuously the organizational flexibility and communications in the coming years.

Reference

- Aksycyn, R.M., McCracken, D.L., & Yoder, E.A. (1988). KMS: A distributed hypermedia system for managing knowledge in organizations. *Communications of the ACM*, 31 (7), 820-835.
- Beath, C.M., & Ives, B. (1986). Competitive information systems in support of pricing. *MIS Quarterly*, 10 (1), 85-96.
- Berry, D. (1983). How marketers use microcomputers (now and in the future). *Business Marketing*, 68 (12), 44, 48-49, 52-53.
- Boone, L.E., & Kurtz, D.L. (1971). Marketing information systems: Current status in American industry. *Combined Proceedings: 1971 Spring and Fall Conferences* (pp. 163-167). San Francisco: American Marketing Association.
- Cash, J.I., Jr., & Konsynski, B.R. (1985). IS redraws competitive boundaries. *Harvard Business Review*, 63 (2), 134-142.
- Conklin, J. (1987). Hypertext: An introduction and survey. *IEEE Computer*, 20 (9), 17-41.
- Haan, B.J., Kahn, P., Riley, V.A., Coombs, J.H., & Meyrowitz, N.K. (1992). IRIS hypermedia services. *Communications of the ACM*, 35 (1), 36-51.
- Higby, M.A., & Farah, B.N. (1991). The status of marketing information systems, decision support systems and expert systems in the marketing function of U.S. firms. *Information & Management*, 20 (1), 29-35.
- Ives, B., & Learmonth, G.P. (1984). The information system as a competitive weapon. *Communications of the ACM*, 27 (12), 1193-1201.
- Johnston, H.R., & Vitale, M.R. (1988). Creating competitive advantage with interorganizational information systems. *MIS Quarterly*, 12 (2), 153-165.
- Li, E.Y. (1995). Marketing information systems in the top U.S. companies: A longitudinal analysis. *Information & Management*, 28 (1), 13-31.
- Li, E.Y., McLeod, R., Jr., & Rogers, J.C. (1993). Marketing information systems in the Fortune 500 companies: Past, present, and future. *Journal of Management Information Systems*, 10 (1), 165-192.
- McFarlan, F.W. (1984). Information technology changes the way you compete. *Harvard Business Review*, 62 (3), 98-103.
- McLeod, R., Jr., & Rogers, J.C. (1982). Marketing information systems: Uses in the Fortune 500. *California Management Review*, 25 (1), 106-118.
- McLeod, R., Jr., & Rogers, J.C. (1985). Marketing information systems: Their current status in Fortune 1000 companies. *Journal of Management Information Systems*, 1 (4), 57-75.
- Mentzer, J.T., Schuster, C.P., & Roberts, D.J. (1987). Micro-computer versus mainframe usage by marketing professionals. *Journal of the Academy of Marketing Science*, 15 (3), 1-9.
- Nielsen, J. (1990). The art of navigating through hypertext. *Communications of the ACM*, 33 (3), 296-310.
- Parsons, G.L. (1983). Information technology: A new competitive weapon. *Sloan Management Review*, 25 (1), 3-14.
- Pedersen, E. (1993). Client/Server, cooperative and distributed complexities. *Midrange Systems*, 6 (11), 25-26.
- Porter, M.E., & Millar, V.C. (1985). How information gives you competitive advantage. *Harvard Business Review*, 63 (4), 149-160.
- Raymond, L. (1985). Organizational characteristics and MIS success in the context of small business. *MIS Quarterly*, 9 (1), 37-52.
- Standard & Poor's Corporation (1992). *Standard & Poor's Register of Corporations, Directors and Executives, Volume 1: Corporations*. New York: Standard & Poor's Corporation.

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