USER SERVICE REQUIREMENTS

OFFICE PRODUCTS

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Many of INPUT's professional staff members have nearly 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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ABSTRACT

The microcomputer service market is undergoing a transition from a rapidly growing, product-intensive market to a maturing, service-oriented market. Service and support are becoming much more important in the selection and use of microcomputers in the corporate environment, as demonstrated by the growing system availability requirements of business microcomputer users.

Key to this transition is resulting service revenues attached to satisfying the increased service requirements. During this transition, users are becoming much more reliant on contractual, on-site maintenance for their business-use microcomputers.

This report analyzes the current microcomputer service market as defined by microcomputer service requirements, and projects how increased use of more sophisticated applications, such as LANs and micro-host links, will affect user satisfaction with present levels of service.

This report contains 146 pages, incuding 76 exhibits.

USER SERVICE REQUIREMENTS
OFFICE PRODUCTS

CONTENTS

EXHIBITS

1 INTRODUCTION

I INTRODUCTION

- This report on the customer service requirements of microcomputer users is produced by INPUT as part of the 1985 Customer Service Program in the U.S. for clients of that program.

- The objective of this report is to identify the growing need for a complete service offering from microcompuer service vendors, whether they be manufacturers, dealer/distributor/retailers, or third-party maintenance organizations.

- The manufacturers of the microcomputers analyzed in this report should pay particularly attention to the user responses in this study, regardless of the source of service, since customer satisfaction (or dissatisfaction) with the after-sale service and support available for a particular microcomputer has a direct effect on the user's next microcomputer purchase decision. This is especially critical to an industry that has computer retirement rate of two years.

- The report begins by analyzing the current microcomputer maintenance and support market business base. In addition to demonstrating the growing role of the microcomputer manufacturer in the mainframe and support of their own equipment, the report analyzes the user satisfaction of service contract holders versus time and material (or per call) customers.

- An in-depth discussion of the role of the user in the maintenance process follows. From relatively minor involvement, such as mailing or carrying the microcomputers to a depot, to the user performing actual repairs, the report analyzes users' willingness to increase their involvement in the maintenance process.

- In addition to traditional measures of customer service satisfaction (e.g., response time, repair time, system availability), the report recognizes the issue of cost of maintenance in respect to customer selection of and satisfaction with service offerings. User attitudes toward alternative service delivery methods are analyzed, along with a discussion of increased user participation in the maintenance process.

- The study also looks at the issue of network service and support. In the past, an absence of communications standardization has resulted in relatively low network usage and even less service and support availability. Increased user interest in networking technology, such as LANs and micro-host links, has broadened the role of the microcomputer in corporate America and caused an increased need for network support.

A. DEMOGRAPHICS

- A total of 222 business microcomputer users were surveyed, both by mail and by telephone, during the months of Februray and March of 1985. The total sample of 222 users surveyed represents an increase of 128% over the microcomputer sample of 1984. Exhibit I-1 provides a breakdown of the total sample by vendor along with the principal products surveyed for. Criteria used in the selection of these products for the sample were their predominance in the business microcomputer market, their impact (or expected impacted) on the business microcomputer market, and interest indicated by clients of the program about the products.

EXHIBIT I-1

1985 MICROCOMPUTER SAMPLE

MICROCOMPUTER MANUFACTURER	NUMBER SURVEYED	PRINCIPAL PRODUCTS SURVEYED
AT&T	10	PC 6300
Apple	69	II-Line, III, LISA, MacIntosh
Compaq	12	Portable, Desk Pro
DEC	13	Rainbow, Professional 350
Hewlett-Packard	14	85, 125, 150, 250
IBM	55	PC, PC-XT, PC-AT
Tandy	38	TRS-80-111, -16, -2000
Other	11	Datapoint Vista, Sperry PC, WANG PC
Total	222	

- Exhibit I-2 compares the 1985 respondent sample to the 1984 business microcomputer installed base. As previously stated, all attempts were made to derive an unbiased respondent sample that reflects the current business microcomputer marketplace. Obviously, the relatively small actual market shares of some important business microcomputers vendors, such as Compaq, AT&T, and Digital Equipment Corporation, required an respondent sample share much larger than their actual share of the business microcomputer marketplace.

- Exhibit I-3 presents an industry breakdown of the business microcomputer sample. The large number of respondents from the education industry is a result of the large number of Apple users. Also, the large number of respondents from the services industries reflect the tremendous number of cross-industry and industry-specific (vertical industry) application software written for companies in the business services industry.

- Exhibit I-4 breaks down the 1985 microcomputer sample by respondent title. As in the past, an emphasis is placed upon contacting respondents who have actual "hands-on" experience with the microcomputer along with knowledge concerning the service and support attached to the microcomputer. In the past, this required contracting respondents outside the Information Systems (IS) area, since individual users and departments were most often responsible for the selection of microcomputers (and their service contracts) within corporations.

- Currently, IS is becoming increasingly involved in the selection and purchase of microcomputers (both hardware and software) and support. This trend is reflected in the large number of IS-related respondents. With the growing interest and use of networked microcomputers, especially micro-host links, this centralization within the corporation should continue.

EXHIBIT I-2

BUSINESS MICROCOMPUTER MARKET SHARE
VERSUS SAMPLE

MICROCOMPUTER	1984 ESTIMATED MARKET SHARE (Percent)	1985 SAMPLE SHARE (Percent)
IBM	33.1%	24.8%
Apple	20.3	31.1
Tandy	15.0	17.1
Hewlett-Packard	6.4	6.3
Compaq	1.9	5.4
AT&T	1.2	4.5
DEC	0.1	5.9
Others	22.0	4.9

EXHIBIT I-3

MICROCOMPUTER SAMPLE BY INDUSTRY SECTOR

Process Manufacturing	38
Discrete Manufacturing	30
Transportation	3
Utilities	1
Banking and Finance	11
Insurance	6
Medical	5
Education	37
Retail	9
Wholesale	4
Federal Government	2
State and Local Government	12
Services	51
Other	13
Total	222

EXHIBIT I-4

1985 MICROCOMPUTER SAMPLE BY RESPONDENT TITLE

RESPONDENT TITLE	
President, Vice-President, Owner	32
Director, Computer Center or MIS	23
DP Manager	47
Operations Manager, Programmer, Systems Analyst	46
Manager of Technical or Administrative Services	5
Other Manager (Includes Lawyer, Partner)	21
Office Managers, Secretary, Other Support	14
Other	34
Total	222

B. METHODOLOGY

- The basis for this report is the questionnaire included in Appendix A. Over 1,500 surveys were sent out in February 1985 to previous respondents of INPUT CSP questionnaires and to new users supplied to us by vendors. Approximately one-third of the sample was a result of the returned responses. The telephone portion of the survey completed the sample.

- Results of the survey were entered into dBASE III data base files, the structure of which is described in detail in Appendix B. The final results were analyzed using Abstat, a statistical package that has the capability of reading and performing statistical analysis of dBASE III files. The exhibits and corresponding analysis are a result of Abstat's analysis.

- To insure complete and accurate responses, all surveyed respondents were guaranteed complete company confidentiality. All demographic information has been removed from the survey results so no individual company or respondent can be associated with a response.

- A list of definitions has been added in Appendix C to aid in clarifying the terminology used. For this report, note that INPUT is analyzing the business-use single- and multiuser microcomputer market only, excluding all home-use microcomputers. For clarity, INPUT will refer to these machines as micros.

- The report itself begins with an analysis of the entire micro sample as a group to show industry trends in the maintenance and support of micros. Areas analyzed include:

  - Sources of maintenance.

  - Contract usage.

- Delivery modes used.

- Purchasing criteria.

- Service satisfaction levels.

- Service performance criteria.

- User willingness to perform self-maintenance.

- Network usage and service requirements.

- Each individual vendor user sample is then presented, providing detailed analysis of each vendor's user group. These users can then be analyzed as a group, with individual vendor information provided in all the above areas, excluding network information.

- A group of users have been included in a section called "other". The significance of these users is in the increased service requirements reported, in terms of system availability, and in the increased usage of their microcomputers.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

- This executive summary is designed in presentation format to provide key research findings and observations in a quick and orderly arrangement. The exhibits have been placed on the right-handed pages with the corresponding text on the facing pages.

- The microcomputer market is undergoing a transition from a rapidly growing, product-intensive market to a maturing, service-intensive market. Microcomputer maintenance and support is becoming much more important in the selection and use of microcomputers in the corporate environment, as demonstrated by increased service requirements of the micro users surveyed in this report.

- This report will show the increased service requirements of users, and how successful each vendor has been in satisfying their users' needs.

A. THE EVOLUTION OF MICROCOMPUTER SERVICE

- In the beginning of the microcomputer revolution, the need to satisfy explosive demand for these new machines required manufacturers to emphasize the manufacturing and distribution aspects of the business, with little thought or resources directed to support. In addition, there was the traditional fear that emphasizing service might threaten sales by implying the equipment was fallible. As a result, what little support that was available was usually delivered at the dealer/distributor/retailer level. Since these distribution points rarely had the resources (or the incentive) to provide on-site service, most microcomputer service was delivered through carry-in or mail-in depot service locations, usually at the place of purchase.

- Spurred by increased user demand for more responsive service, resulting from increasingly sophisticated applications, manufacturers began to recognize the growing revenue potential resulting from an increased participation in the service process. To satisfy this growing need for responsive service, on-site maintenance grew in acceptance as a delivery method, with 40% of all microcomputer maintenance performed this way. Also, many vendors began offering forms of software support, such as toll-free telephone support lines.

- In the future, microcomputer manufacturers should gain control of microcomputer service and support industry, with primary competition from third-party maintenance companies. As microcomputer networking, such as micro-host links, becomes commonplace, users will increasingly opt for on-site maintenance, to be supplemented with remote support (RSS) for the software and communications portion of the systems. As hardware maintenance becomes almost standardized, the leaders in micro support will emphasize other services, such as consulting, training, and documentation services.

- Exhibit II-1 shows both past and present services offered as well as projected service offerings.

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MICROCOMPUTER SERVICE EVOLUTION

Service Revenue Potential

PAST	PRESENT	FUTURE
Dealer Service	Dealer TPM MFR	MFR TPM
Depot	Depot On-Site	On-Site RSS
Hardware Service	Hardware and Software	Post-Sale Support

Increased User Needs

B. MICROCOMPUTER HARDWARE PERFORMANCE BY VENDOR

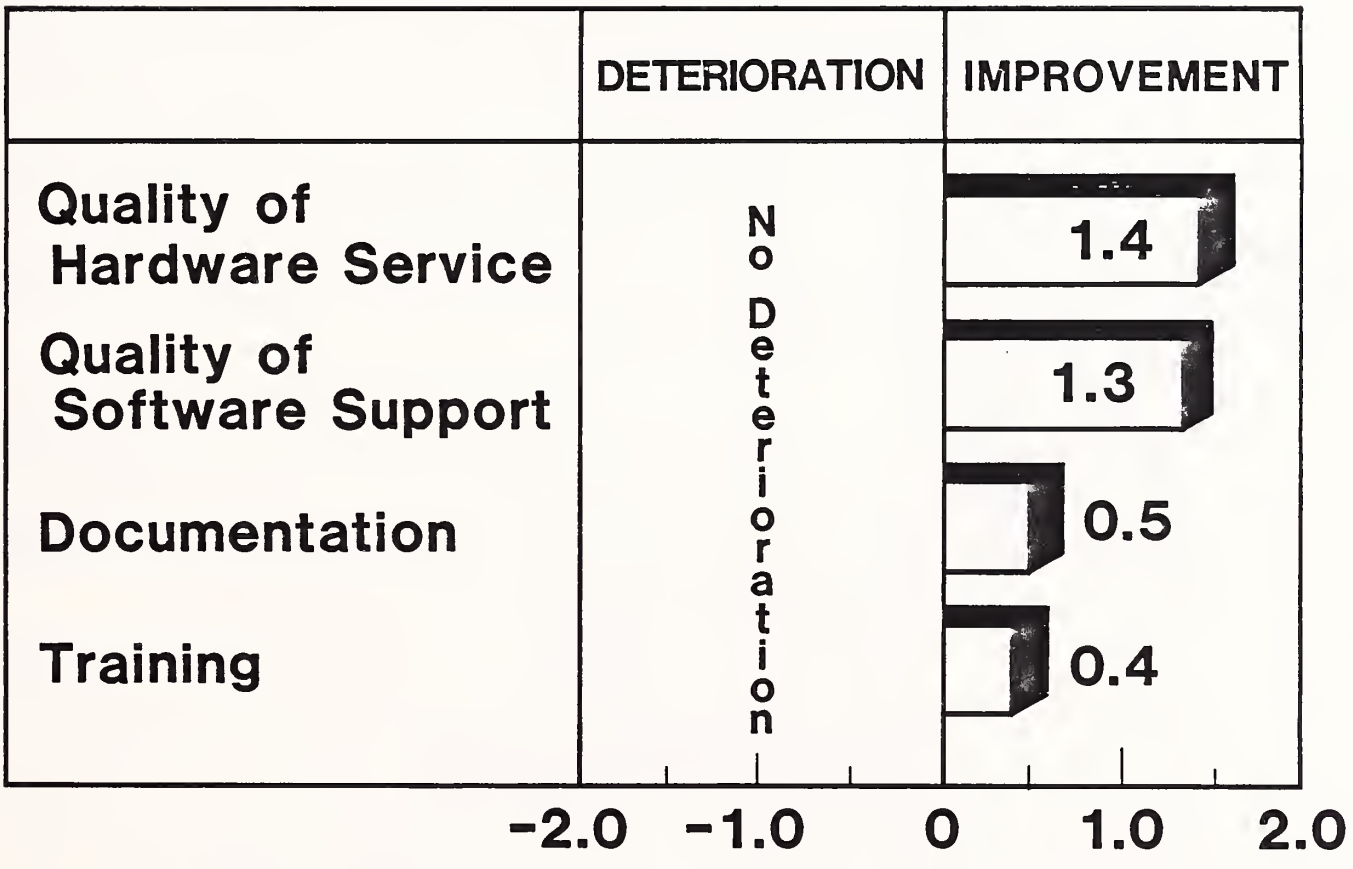
- We have seen an important transition in the delivery of maintenance and support of microcomputers. In the past, microcomputer service was predominantly performed on a carry-in or mail-in basis, and usually was the responsibility of the dealer who sold the machine. Since these dealers were in business to sell microcomputers, and the implication that maintenance and support would hurt sales, the importance of microcomputer service was often played down, if not ignored all together.

- In response to increase user service requirements, along with the realization of the revenue potential that could be derived from service, manufacturers have dramatically increased their direct participation in the maintenance and support of their equipment. As a result, microcomputer user satisfaction with service has improved in almost all service areas, as shown in Exhibit II-2.

- As is often the case, most effort is made in improving hardware maintenance performance, since this area has greatest visibility and most service organizations have the greatest involvement and control over this area. It's encouraging to see the improvement microcomputer users report in software maintenance, since this area will become the major competition area for microcomputer vendors.

- While both documentation and training were areas of improved service, microcomputer service vendors will need to increase their participation and control over the quality of these services. Manufacturers need to emphasize their performance in these service areas as advantages over TPM companies, who do not have the resources to compete in these service areas.

MICROCOMPUTER VENDOR PERFORMANCE IMPROVING



C. MICROCOMPUTER USER SATISFACTION WITH HARDWARE MAINTENANCE

- Overall, microcomputer hardware maintenance has improved dramatically in 1984, as shown in Exhibit II-3. Individually, five of the eight user groups surveyed reported hardware maintenance satisfaction levels that exceeded the industry average. IBM users reported the highest satisfaction rating of all micro users, reflecting IBM's increased participation in supporting its own equipment, followed closely by Hewlett-Packard.

- Most disturbing of the results was the low satisfaction rating that AT&T received from its users. Given that AT&T users have higher service requirements than most microcomputer users, the extremely low marks reported reflect a disorganized service structure.

- Tandy also received poor marks from its users, a result of extremely poor system availability, response times, and repair times. This dissatisfaction underlines the growing importance of system availability, which is a direct result of the growing sophistication of microcomputer applications.

- All vendors will need to recognize the steadily increasing service requirements of microcomputer users, which have been spurred by the growing sophistication of software and communications applications. As system availability requirements continue to rise, microcomputer service vendors will need to continue emphasizing the value of on-site maintenance in order to satisfy user service requirements.

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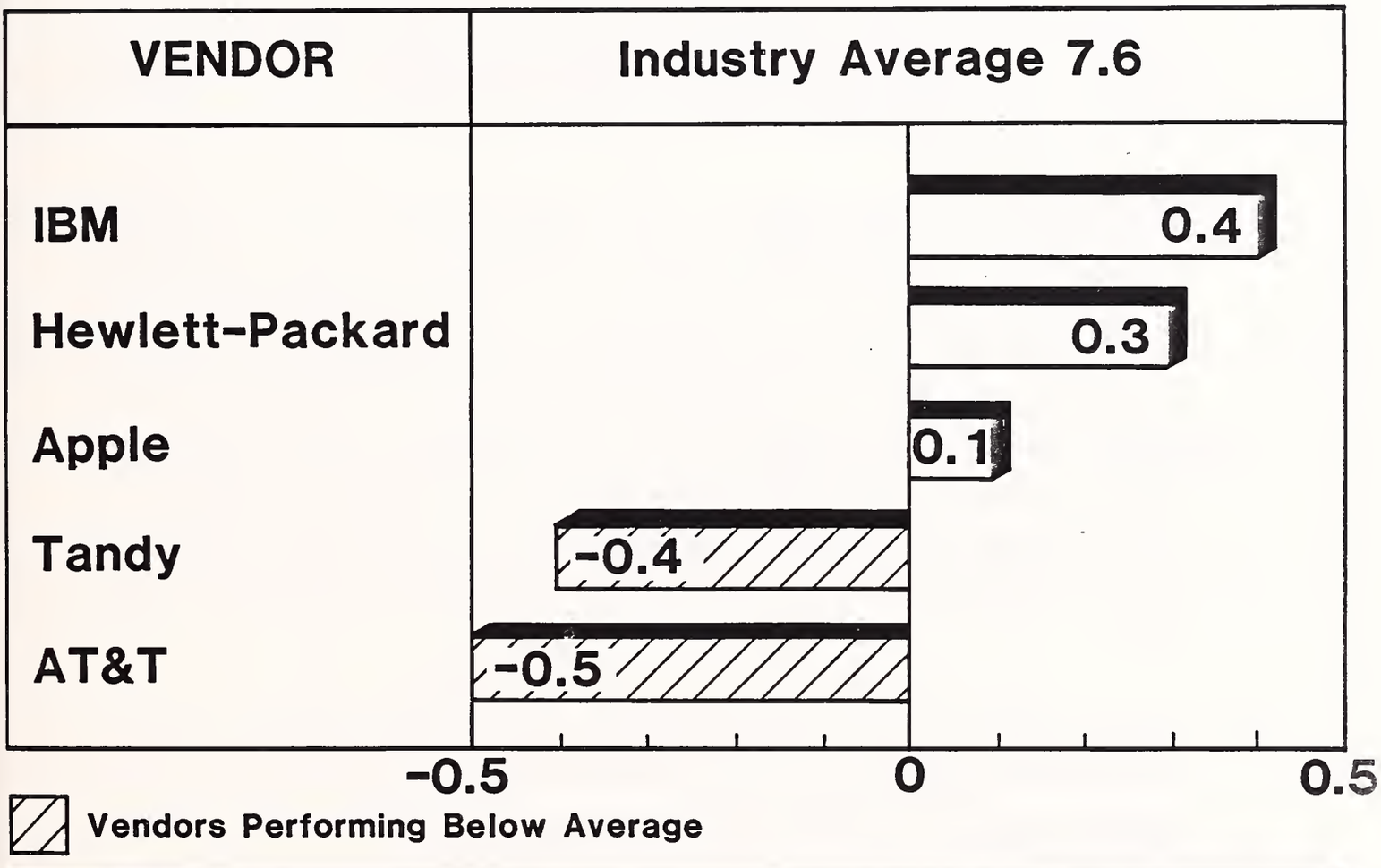
MICROCOMPUTER USER SATISFACTION WITH HARDWARE MAINTENANCE



D. RISING SYSTEM AVAILABILITY REQUIREMENTS NOT BEING MET

- In the past, microcomputers were thought to be used mainly by hobbyists, home users, and individuals within companies who were using the microcomputers for relatively unimportant applications. Since the sales and marketing groups within the microcomputer vendors did not wish to endanger sales by stressing service and support (which would imply that the equipment might break down), microcomputer maintenance and support was relegated to a back seat. Emphasis was placed upon the reliability of the microcomputer, which at the time was sufficient to satisfy the system availability requirements of individual users.

- Soon microcomputers became an acknowledged presence in the corporate environment. Sales of microcomputers increased dramatically, and competitive pressures, along with manufacturing advances, brought prices down. Since corporate information systems groups recognized the importance of computer maintenance and support, microcomputer vendors began to market and sell service to large corporations. But services costs were high, causing service pricing to be a prohibitive factor in the wide-scale acceptance of microcomputer maintenance. Instead, microcomputers were expected to become "disposable items," since purchase prices were dropping at a rapid rate.

- Instead, applications for microcomputers in corporations became so sophisticated, with micro-host and other networking links, that microcomputer user system availability requirements have risen much faster than expected. Exhibit II-4 shows that micro users' system availability requirements are rising to the level of minicomputer uptime requirements, while performance is lagging. This will open the door for alternative service vendors, such as third-party maintenance companies, if manufacturers don't increase their involvement in maintaining their own equipment, especially in on-site maintenance.

GROWING REQUIREMENT FOR SYSTEM AVAILABILITY

YEAR	SYSTEM AVAILABILITY		△%
	REQUIRED	RECEIVED	
1984	81.7%	86.0%	+ 4.3%
1985	89.1	85.5	- 3.6%
	+ 7.4%	- 1.5%	

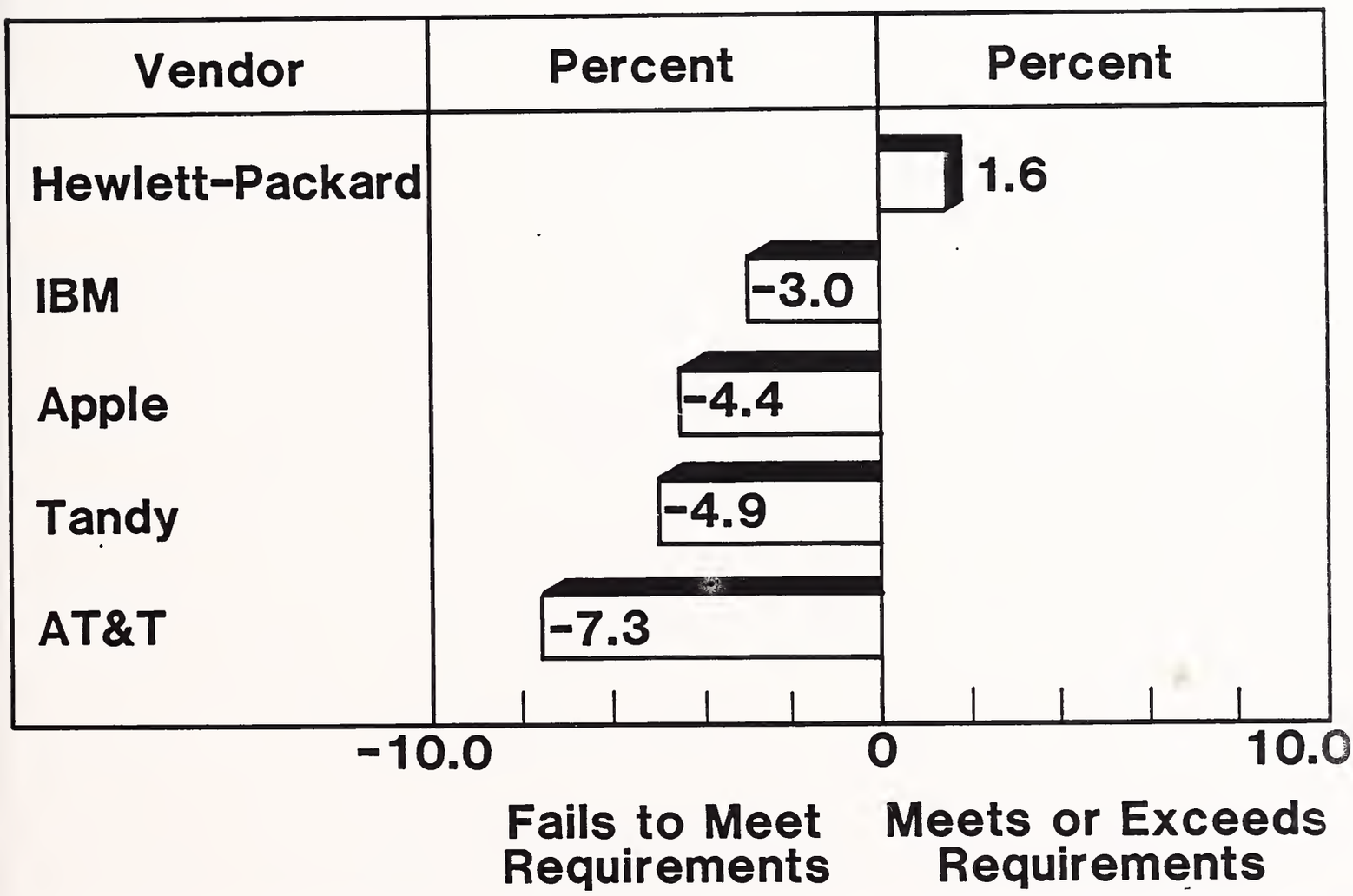
E. MICROCOMPUTER VENDOR SYSTEM AVAILABILITY PERFORMANCE

- As a group, microcomputer vendors are failing to satisfy their users' growing system availability requirements. This is in part due to the reluctance of manufacturers to recognize that as microcomputers begin to replace larger systems (such as small business systems and traditional minicomputers) in corporations, microcomputer users will need to receive service and support offerings and performance levels that rival those for the equipment they have replaced. This will be especially true as more microcomputers become used in networked applications, where their downtime will deteriorate the overall system's uptime level.

- Rather than relying on outside dealers for the distribution and support of their microcomputers, microcomputer manufacturers will need to have a more direct involvement and control of the quality and quantity of service and support delivered to their users. Instead of relying on the quality of design and manufacture of their equipment, manufacturers will need to market the need for responsive service and support. Exhibit II-5 shows the vendor with the most control over the delivery of maintenance to its users, Hewlett-Packard, comes closest to meeting or surpassing its users' system availability requirements by offering (and stressing the value of) responsive on-site maintenance coverage.

- In the future, microcomputer vendors will need to meet the challenge of even higher system availability requirements. These vendors will need to provide not only responsive hardware and software through on-site offerings and, eventually, remote support services, but also post-sale support offerings that will improve user satisfaction with the operations of their microcomputers.

MICROCOMPUTER SAMPLE SYSTEM AVAILABILITY VERSUS USER REQUIREMENTS



III MICROCOMPUTER SERVICE ANALYSIS--ALL VENDORS

III MICROCOMPUTER SERVICE ANALYSIS—ALL VENDORS

A. SOURCE OF MAINTENANCE

- One of the most significant changes in the maintenance and support of microcomputers is the greater involvement of manufacturers in servicing of their own equipment. This has been spurred by the increased activity of traditional service-minded small- and large-systems vendors, such as AT&T, DEC, and Hewlett-Packard, in the microcomputer marketplace. Even IBM, who originally relied almost completely on dealers, distributors, retailers, and third-party maintenance (TPM) companies to support their micros, has increased its own direct involvement in micro support.

- Exhibit III-1 provides a breakdown of the 1985 microcomputer sample by the user's primary source of maintenance. Note that traditional small-system vendors, AT&T, DEC, and HP, provide predominantly manufacturer-supplied maintenance; however, these companies comprise only a minor share of the marketplace. Instead, the significant contributor to manufacturer support is Tandy, which provides all service and support through its extensive network of Radio Shack retail stores.

- Exhibit III-2 breaks the sample down by vendor for contract users, time-and-material (T&M) users, and users who consider themselves as their primary source of maintenance. Note that for almost all vendor user groups who receive direct manufacturer support the majority of all service performed on

EXHIBIT III-1

1985 MICROCOMPUTER SAMPLE BY PRIMARY SOURCE OF MAINTENANCE

VENDOR	PRIMARY SOURCE OF MAINTENANCE			
	Manufacturer	Dealer/Distributor/Retailer	TPM	Self
All	43.7	37.8	3.6	14.9
AT&T	90.0	10.0	0.0	0.0
Apple	4.3	67.2	3.9	24.6
Compaq	0.0	83.3	0.0	16.7
DEC	84.6	0.0	0.0	15.4
Hewlett-Packard	92.9	7.1	0.0	0.0
IBM	25.5	47.3	10.9	16.3
Tandy	94.7	0.0	0.0	5.3
Other	100.0	0.0	0.0	0.0

EXHIBIT III-2

MICROCOMPUTER SAMPLE BY MAINTENANCE CONTRACT USAGE

VENDOR	CONTRACT (Percent)	T & M (Percent)	SELF (Percent)
All	35.6%	53.2%	11.2%
AT&T	80.0%	10.0%	10.0%
Apple	13.0	63.8	23.2
Compaq	16.7	75.0	8.3
DEC	76.9	23.1	0.0
Hewlett-Packard	78.6	21.4	0.0
IBM	45.5	43.6	10.9
Tandy	15.8	81.6	2.6
Other	72.7	27.3	0.0

microcomputers is done contractually. The sole exception is Tandy, whose users predominantly use T&M maintenance.

- This increase in contract maintenance coverage reflects both the increased requirement for high-quantity, high-quality, on-site maintenance by microcomputer users, and the recognition of the tremendous revenue growth potential of maintenance contracts, which unlike product sales provide a continual flow of revenues for the life of the product.

B. DELIVERY OF MAINTENANCE

- Along with the greater involvement of manufacturers in the service and support of their microcomputers, another major shift in the microcomputer maintenance market is the greater reliance on contract on-site maintenance by users. Exhibit III-3 shows that over 40% of the microcomputer user market now receive their maintenance on-site, up from 38% of the market in 1984. More significantly, almost 61% of the respondents receive their on-site maintenance on a contractual basis, versus only 37% in 1984.

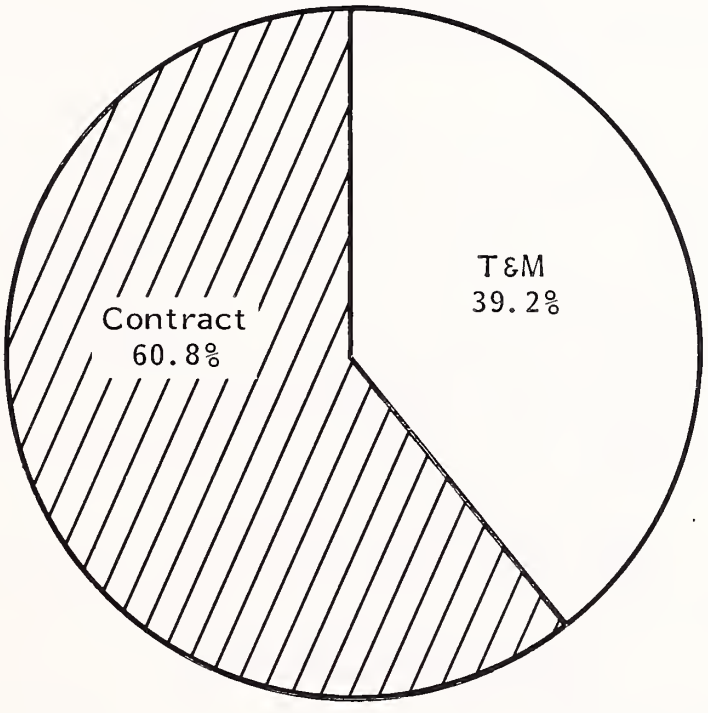
- A number of factors have contributed to this shift toward contract, on-site maintenance. First of all, a number of manufacturers traditionally associated with high-quality service in the small-systems market, such as Sperry, Wang, and AT&T, have begun to impact the microcomputer market with increased service offerings. At the same time, older microcomputer vendors, such as HP, DEC, and IBM, have increased and improved their services and support offerings.

- These improvements in the service industry are a direct result of increased microcomputer user demand for service. User service requirements have been increased dramatically by the greater functionality of their microcomputers. Instead of being considered strictly "personal productivity tools," today's

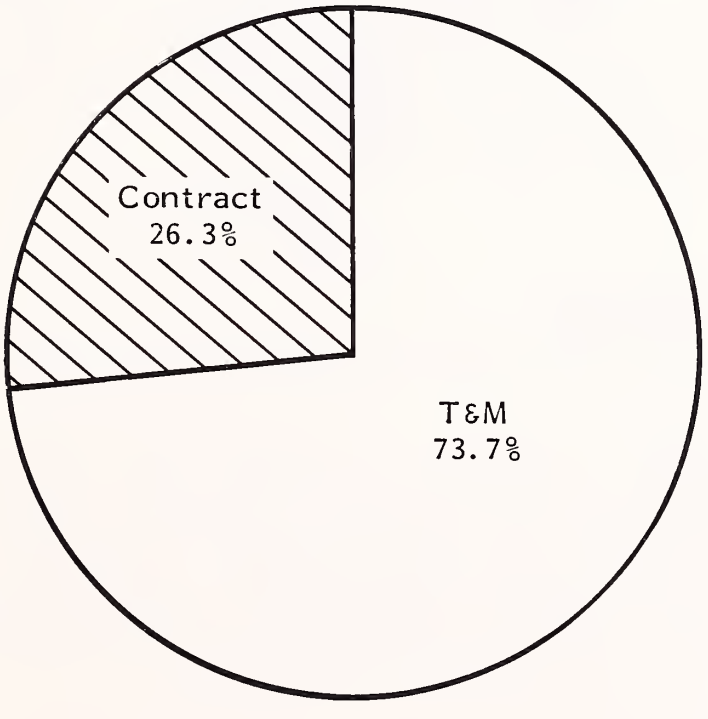
EXHIBIT III-3

CONTRACT USAGE - ON-SITE VERSUS DEPOT

On-Site = 40.5%



Depot = 59.5%



microcomputers are increasingly linked through networks and micro-host applications. Also, corporate IS groups, who are more experienced with and demanding of on-site maintenance of computers, are becoming more involved in the selection, purchase, and support of microcomputers. All these factors have spurred microcomputer maintenance vendors to upgrade their service offerings, most notably for response and repair.

- A final factor which has influenced the delivery of microcomputer maintenance is the increased product density, both within companies and within geographic areas. This natural by-product of the tremendous growth in the microcomputer market has made it much less expensive to provide on-site maintenance to larger companies located in metropolitan areas. Maintenance vendors can offer much more attractive pricing contracts, with discounts based upon quantity of microcomputers at centralized locations.

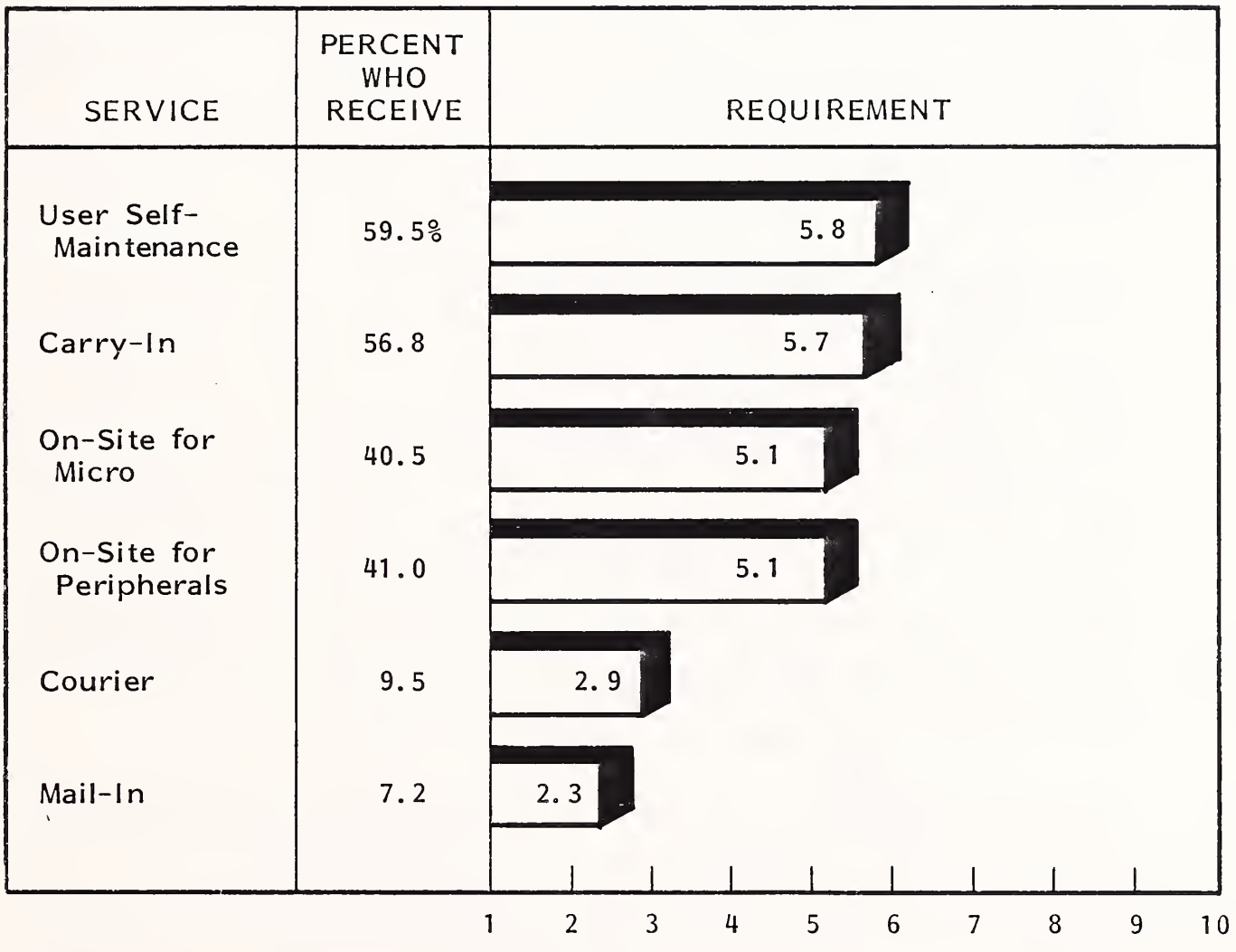
- It would be unwise to expect that on-site support will become the sole maintenance delivery method for business-use microcomputers. Certain users, due to their own expertise, price-sensitivity, or a combination of these factors, will opt for depot or self-maintenance. This is supported by Exhibit III-4, which demonstrates that current users still value carry-in maintenance and a certain level of self-maintenance. However, the availability of a premium service offering, such as on-site maintenance, will make these depot and self-maintenance customers less price-sensitive, and, in the long run, more satisfied with the level of support they received.

C. PURCHASE CRITERIA

- One measure of the importance users place on the availability, quantity, and quality of maintenance and support of their micros is the relative importance of service in the micro purchase decision. In the past, micro support was seldom available, therefore service was not a relatively important factor in

EXHIBIT III-4

USER EXPERIENCE WITH
ALTERNATIVE MAINTENANCE DELIVERY METHODS



selection. Now, as micro support becomes more available to the users from dealers, distributors, TPMs, and, most significantly, manufacturers, service is becoming more important to the corporate user as a criteria in the selection of their equipment.

- This trend is supported by Exhibit III-5, which lists the 1985 micro user ratings of the relative importance of selected purchase decision criteria. Note that maintenance price, as a purchase criteria, has increased significantly in importance to micro users. This is a result both of the increase need for maintenance, caused by more sophisticated applications for the micro (e.g., micro-host links), and of the increased availability of support, which, if nothing else, has increased competition for the micro-users' service dollar. Both these factors have led to greater maintenance price-sensitivity of users.

- System availability, the measure of a micro's reliability, is still perceived by users as the most important selection criteria. On the surface, this seems to support Apple's contention that building reliable (and eventually user-supportable) machines will make up for their lack of direct support available. Later, we will see that this contention is not supported by the users, who report that their system availability requirements are not being met by their vendors. Furthermore, the variance between user system availability requirements and what they receive may widen if manufacturing improvements don't keep up with the increasingly sophisticated applications that micros will be used for in the near future.

- The importance of system availability cannot be overstressed, as users look at micros less as individual productivity tools and more as group productivity machines. As micros become linked to the overall corporate IS system, whether it is a mainframe or minicomputer, users will expect the same level of system availability from their micro as they expect from their host computer.

EXHIBIT III-5

MICROCOMPUTER SAMPLE PURCHASE DECISION CRITERIA

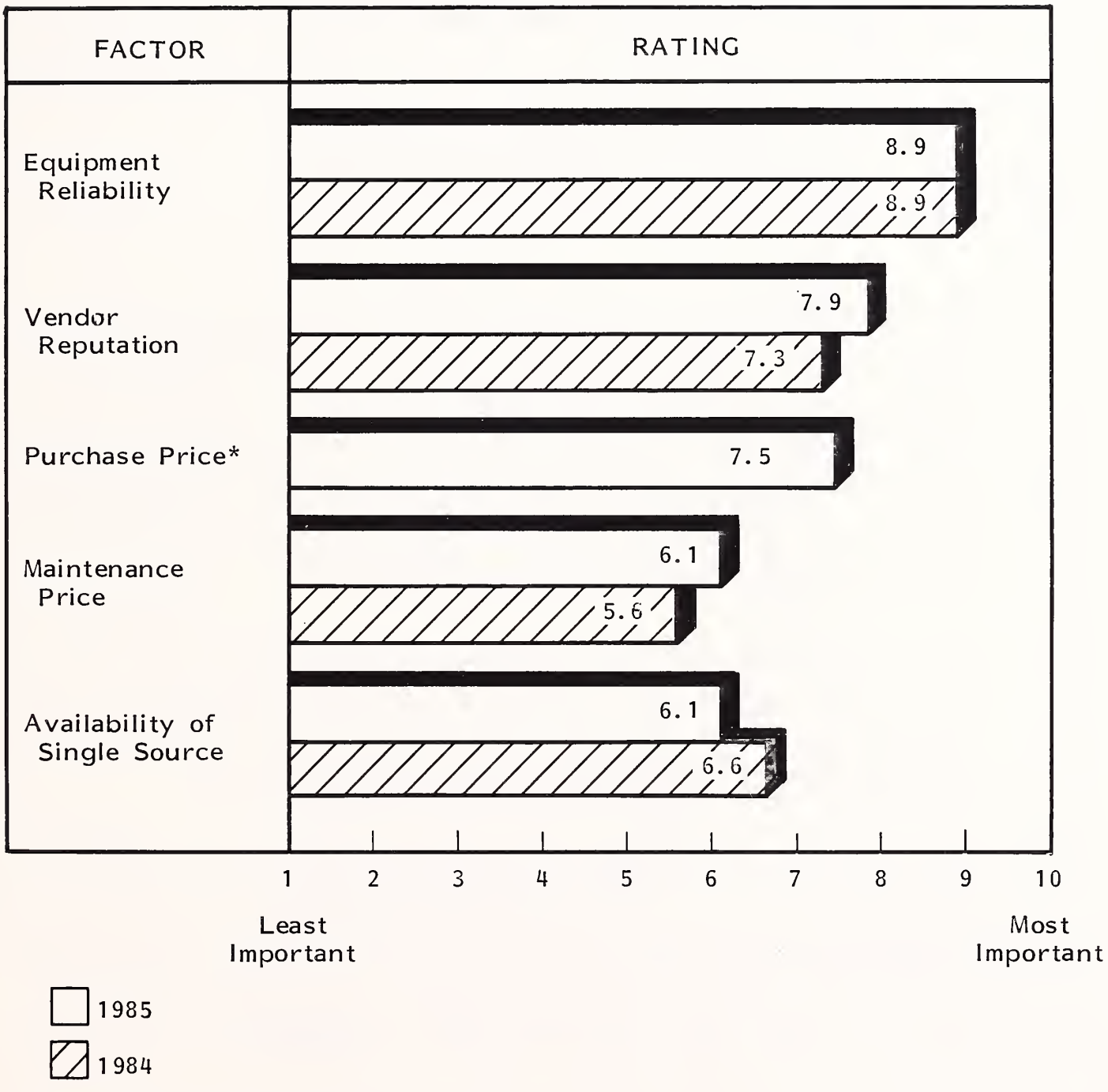


*Figure not available for 1984.

- The fact that the availability of a single-source of maintenance received the lowest importance as a selection criteria can be taken to support the contention that the increased price-sensitivity of users has opened up the micro service market to a greater extent to TPM firms. But satisfaction with the quality and comprehensiveness of their service will still guide users to vendors who can successfully present their service offering as one which will support all the products within the user's system. As with system availability, the importance of single-source of maintenance will grow as a result of increased use of multiuser applications, whether they are local area networks (LAN) or micro-host links.

D. USER SATISFACTION WITH SERVICE--ALL VENDORS

- The increased activity in microcomputer maintenance and support is a recognition by service vendors, particularly manufacturers, of the importance of satisfying user needs for optimum system availability. A number of factors can act to limit system availability; some are outside of the service vendors control (manufacturing quality, user abuse), but most are activities or products that the microcomputer service vendor provides to the end user on a contractual basis.

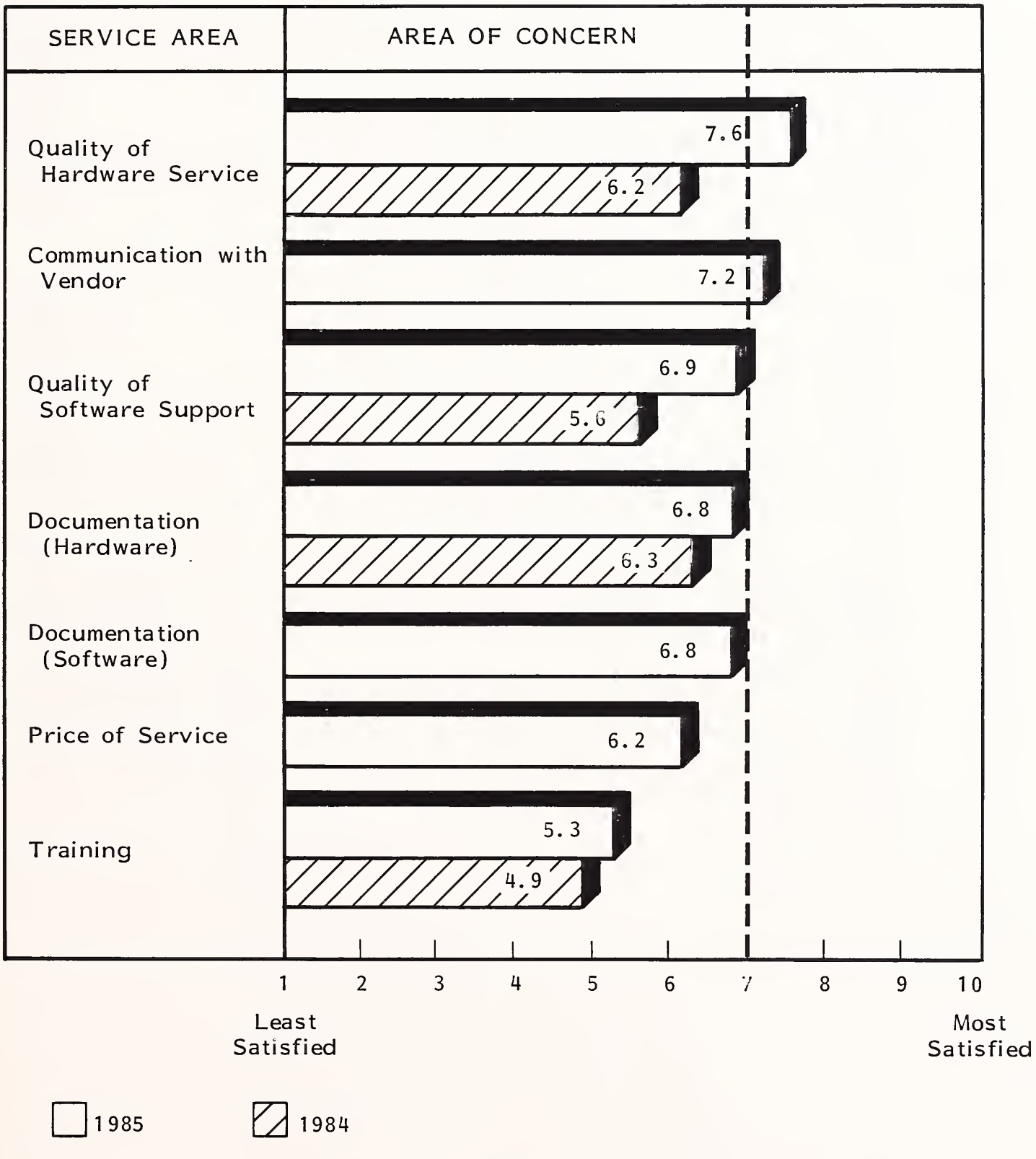
- INPUT has identified seven key areas of service to the microcomputer user, as shown in Exhibit III-6. Where possible, corresponding ratings from the 1984 microcomputer sample have been included in order to show any improvement or deterioration of service satisfaction levels from 1984 to 1985.

- Overall, micro users report general satisfaction with the quality of hardware maintenance that they receive. Areas of immediate concern continue to be in documentation, both in hardware and more conspicuously in software, and training, which received the lowest satisfaction rating. Although it is encouraging to see that users' satisfaction levels are improving from 1984, the

EXHIBIT III-6

MICROCOMPUTER USER SATISFACTION WITH SERVICE

VENDOR: ALL



comparatively low satisfaction ratings reported by micro users is dismaying in light of the tremendous requirement that micro users have for these services. Since users of micros are typically first-time users, their requirements for educational and professional services are much higher than those of other systems users.

- More traditional measures of user satisfaction--system availability, response time, and repair time--are analyzed in Exhibits III-7 and III-8. These measures are recognizable to both users and vendors alike; users can easily measure and hence are very aware of downtime, which is made up of the combination of response time and repair time, and vendors can also measure response and repair times and have more control over these indices.

- In the past, users were more accepting of reduced system availability. Most applications were not as critical as they are today, and if a problem required a computer to be down for any length of time, the user could find another machine to use (whether it be a calculator or another micro). Also, users were conditioned to expect longer response and repair times since maintenance was typically mail-in to dealer, distributor, or retailer.

- Currently, the emergence of direct manufacturer service, along with the more sophisticated use of the micro, has dramatically increased the system availability requirements of micro users. Exhibit III-7 shows the actual use of the micro in corporations. The exhibit demonstrated a positive correlation of hours used per day and increased system availability requirements, particularly for more business-oriented machines such as the AT&T PC 6300 and the DEC Rainbow.

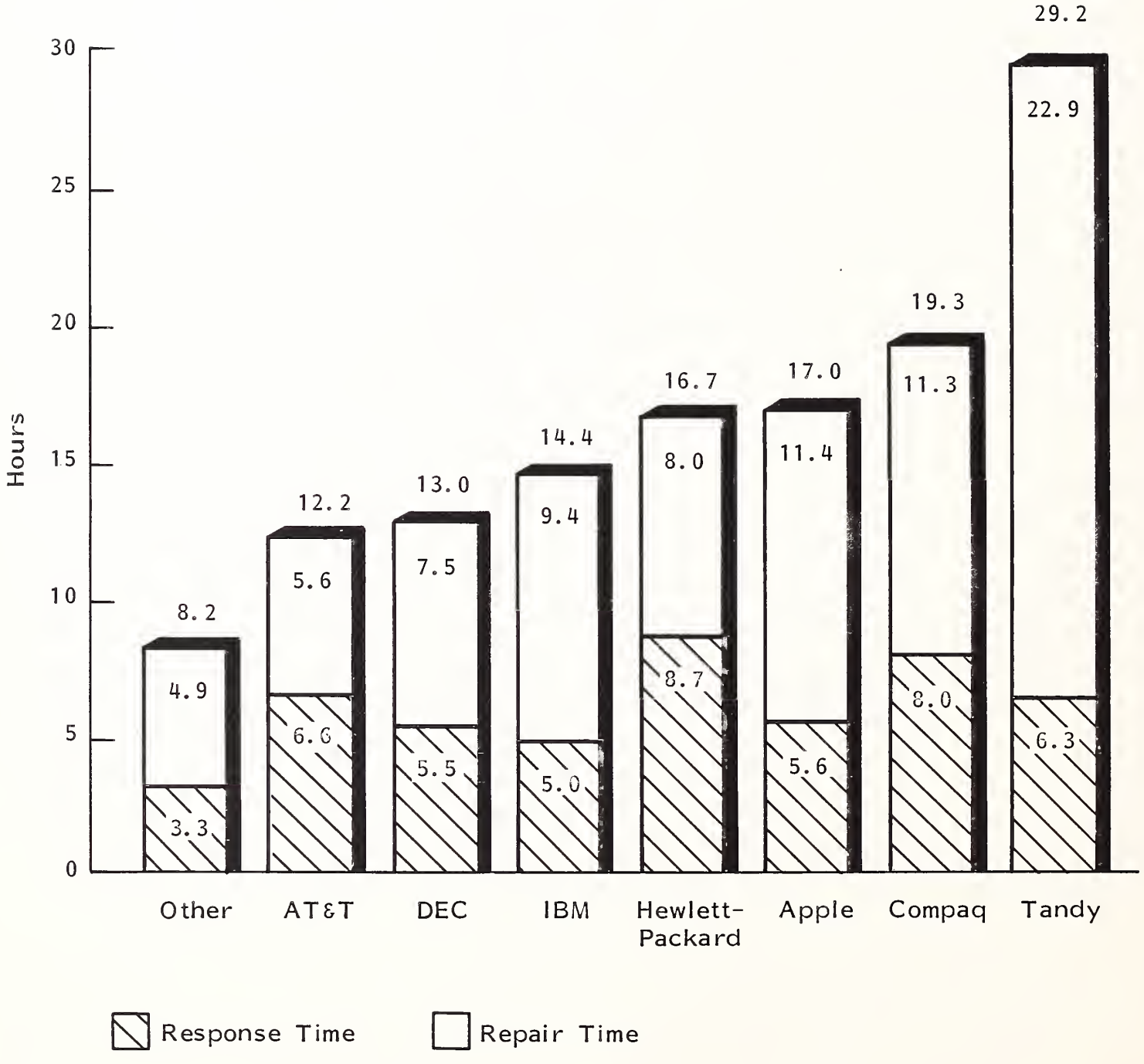
EXHIBIT III-7

MICROCOMPUTER SAMPLE USAGE AND SYSTEM AVAILABILITY

VENDOR	HOURS USED PER DAY	SYSTEM AVAILABILITY REQUIRED (Percent)	SYSTEM AVAILABILITY RECEIVED (Percent)
All	5.0	89.1%	85.5%
AT&T	7.3	91.5	84.2
DEC	6.8	94.2	91.7
Other	5.6	95.9	97.3
Apple	4.9	86.9	82.5
Compaq	4.9	97.9	92.4
Hewlett-Packard	4.9	94.6	96.2
Tandy	4.5	75.6	70.5
IBM	4.4	94.7	91.7

EXHIBIT III-8

HARDWARE MAINTENANCE TURNAROUND TIME



E. USER INVOLVEMENT IN MAINTENANCE

- As previously shown, there are a significantly large number of micro users who are already involved in or are their own principal source of maintenance and support of their own machines. Exhibit III-4 has already demonstrated that almost 60% of all micro users engage in some form of self-maintenance, and that these users perceive their involvement as important in the overall upkeep of their equipment.

- Exhibit III-9 shows the level at which users feel comfortable in providing their own maintenance. As shown in the exhibit, most users who are willing to maintain their own equipment are most comfortable working at the board level, usually installing and replacing boards.

- Another 12% are willing to work at the chip level, whether adding additional memory or replacing defective chips. These users derive the most benefit from chip-level diagnostics built into the computers normal start-up routine.

- A surprising percentage of the users, 16%, would be willing to perform maintenance at any level, including wiring and soldering repairs. These users must be in part holdovers from the "hobbyists" who in the past made up a large share of the microcomputer market.

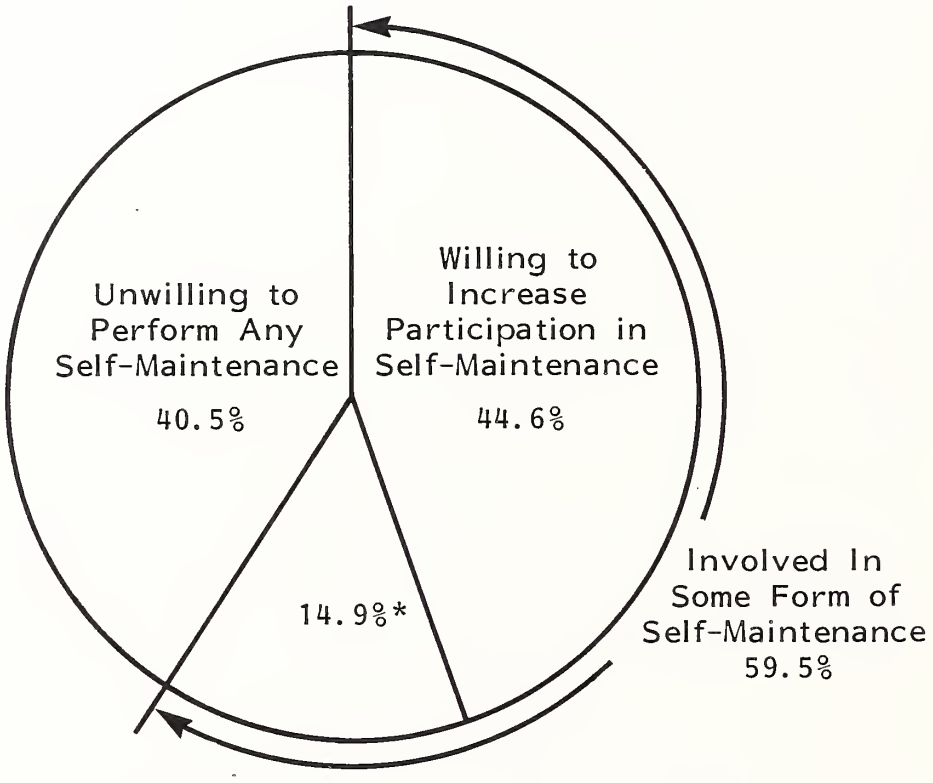
- Again, it is important to note that 15% of all micro users surveyed consider themselves their primary source of maintenance. In order to better serve these users, it is crucial that micro vendors emphasize three areas of service:

  - Improved documentation.

  - Increase parts availability.

EXHIBIT III-9

USER INVOLVEMENT IN SELF-MAINTENANCE



*Consider Themselves the Primary Source of Maintenance

Level Willing to Maintain
(In Increasing Order of Difficulty)

Component Level	9.7%
Board Level	62.4
Chip Level	11.8
All Levels	16.1%

- More accessible telephone support, not only for software problems but also for hardware problems.

- Since users are becoming more price-sensitive toward maintenance, vendors will need to adopt offerings that provide varying levels of service at reasonable price levels. Exhibit III-10 shows that the most attractive alternative service delivery methods (apart from on-site maintenance), carry-in and user self-maintenance, should carry distinct discounts in the eyes of the users. Respondents who are willing to increase their participation in maintenance by carrying their micro products to a depot location expect to pay 27% less than if they received on-site maintenance. In order to increase their involvement in actual repairs, with the support of their vendor, users expect a discount of 42%. These users, it should be noted, would still expect to receive some service and support from their vendor.

F. NETWORK USAGE AND SERVICE

- For the past two years, the lure of office automation, spurred by the tremendous growth of the microcomputer market in corporate America, has moved both user and vendor toward avenues which will link microcomputers with other micros, computer equipment, and sources of computer-based information. This movement has changed the microcomputer from being strictly a personal (or individual) productivity tool to being a multi-user (and eventually multi-tasking) group productivity tool.

- Despite all the technological advances in the microcomputer market, technology has still hindered the eventual realization of the automated office, due to a lack of communication standards for hardware and a lack of true microcomputer multi-user data storage and handling. Users have contributed to stalled office automation by not recognizing and satisfying the need for the development of an overall plan for managing the multi-user microcomputer user base within corporations.

EXHIBIT III-10

MICROCOMPUTER USER WILLINGNESS TO
INCREASE PARTICIPATION IN MAINTENANCE

VENDOR: ALL

SERVICE	WILLING TO INCREASE PARTICIPATION (Percent)	PERCENT DISCOUNT EXPECTED FOR PARTICIPATION
User Self-Maintenance	59.5%	42.4%
Carry-In	52.2	26.9
Mail-In	22.1	30.8

- Exhibit III-11 demonstrates the slow growth in networked systems, both in actual usage and in expected growth, in the next two years. Although users feel that network usage will at least double in the next two years, even they must be frustrated by the lack of actual growth in networked systems.

- The networks currently being used are these main types: local area networks (LANs), micro-to-host connections, and micro-to-RCS networks. Currently, the majority is shared by users of LANs and micro-host connections, representing almost 90% of the networks reported by users. Each network type presents distinct service needs and strategies.

- All of the LAN users reported that they either used internal support in maintaining their network or, even more alarming, that they did not know of any support plans for their network.

- On the other hand, micro-to-host users reported that they almost always received network support from their host computer maintenance vendor.

- The lack of LAN support is in part a result of the same lack of communication standardization that is preventing the LAN market from growing to the levels initially expected. A major stumbling block to LAN support has been the inability of service vendors to run diagnostic loops through multi-vendor networks. This forces users to assemble networks with products from a single vendor, or requires users to disconnect foreign peripherals from the network at the time of fault determination.

- Micro-to-host users, on the other hand, receive a high level of service and support from their vendors since the response time, repair time, and system availability requirements of their systems are automatically upgraded to the level that they receive for their host computer.

EXHIBIT III-11

NETWORK USAGE GROWTH, 1984-1985

	1984	1985
Currently Use	15.9%	16.1%
Plan to Use in the Next Two Years	36.7	37.8

IV MICROCOMPUTER SERVICE ANALYSIS--AT&T

IV MICROCOMPUTER SERVICE ANALYSIS—AT&T

A. PURCHASE CRITERIA

- As shown in Exhibit IV-1, AT&T microcomputer users as a group demonstrated that purchase price and vendor reputation were major criteria in the selection of their microcomputers. This is not surprising; AT&T almost immediately marketed its machine as a better price/performance value than its main competitor, IBM, and was able to rely on its preeminence as the telecommunications leader to attract customers.

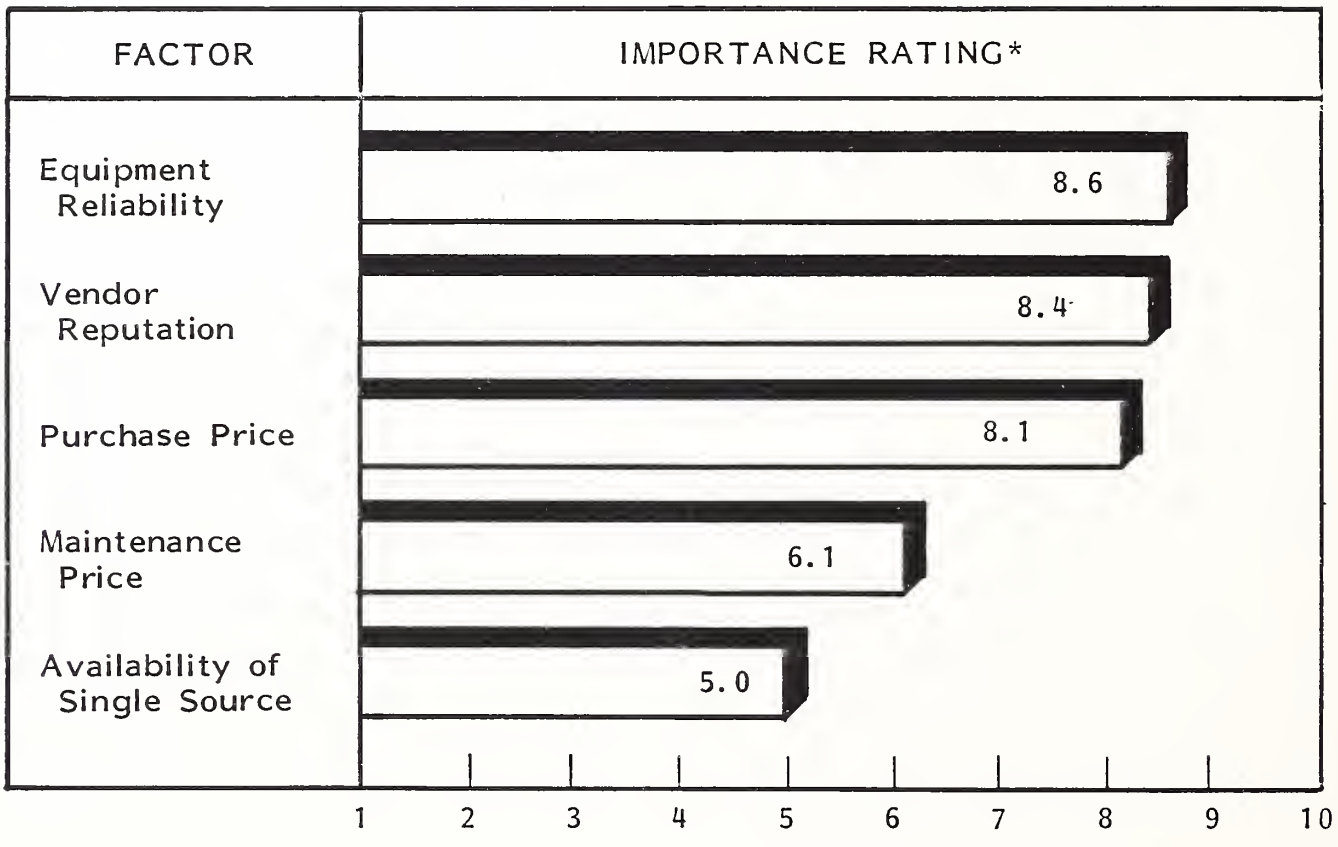
- At a service level, the fact that AT&T users rated equipment reliability lower as a purchase criteria than the average of the whole group (as shown in Exhibit III-5), supported by the relatively low system availability requirements of the users, implies that users were swayed by the promise of telecommunications expertise versus other service performance criteria. Still, as with all other user groups, AT&T users rated equipment reliability as the most important selection criteria.

- An area where AT&T can exploit the value that its users place upon vendor reputation is that of single-source support capabilities, which currently is considered by its users as a minor decision factor. If AT&T could successfully market its ability to provide maintenance and support of complete systems, including networked micros, it would be able to differentiate its service offerings from those of the rest of the industry.

EXHIBIT IV-1

IMPORTANCE OF MAINTENANCE FACTORS
IN PURCHASE DECISION

VENDOR: AT&T



* 1 = Low Importance, 10 = High Importance

B. USER SATISFACTION WITH SERVICE—AT&T

- AT&T users reported low satisfaction levels in a number of key service areas, as shown in Exhibit IV-2. Most notable low satisfaction levels were with documentation (both hardware and software) and training, which received the lowest rating of all micro vendors.

- Both hardware service and software service satisfaction levels are also areas of concern for AT&T users, who reported use satisfaction levels considerably lower than those reported by the total sample, as indicated by Exhibit IV-3. These concerns are compounded by the fact that AT&T users reported the highest use, almost seven hours per day, of all micro users (Exhibit IV-4).

- Exhibit IV-4 also helps explain why AT&T users are concerned about service. Although their machines incur hardware failures relatively infrequently, averaging just over three failures per years, AT&T users reported that their system availability was much lower than their availability requirements. This area will need immediate improvement as system availability requirements will undoubtedly rise, both for the PC 6300 and even more so for the new PC 7300.

- The newer AT&T machines will also necessitate improvements in the software support area, since user requirements for software support will increase as the multi-user market becomes better defined. AT&T users are relying on AT&T to provide the level of support needed in multi-user and networked applications that are heavily software-related. Again, AT&T micro users based a significant portion of their purchase decision on AT&T's reputation as a telecommunications leader. Unless rapid improvements are made, the inability of AT&T to provide adequate software support will allow IBM to dominate the multi-user microcomputer market completely.

EXHIBIT IV-2

MICROCOMPUTER USER SATISFACTION WITH SERVICE

VENDOR: AT&T

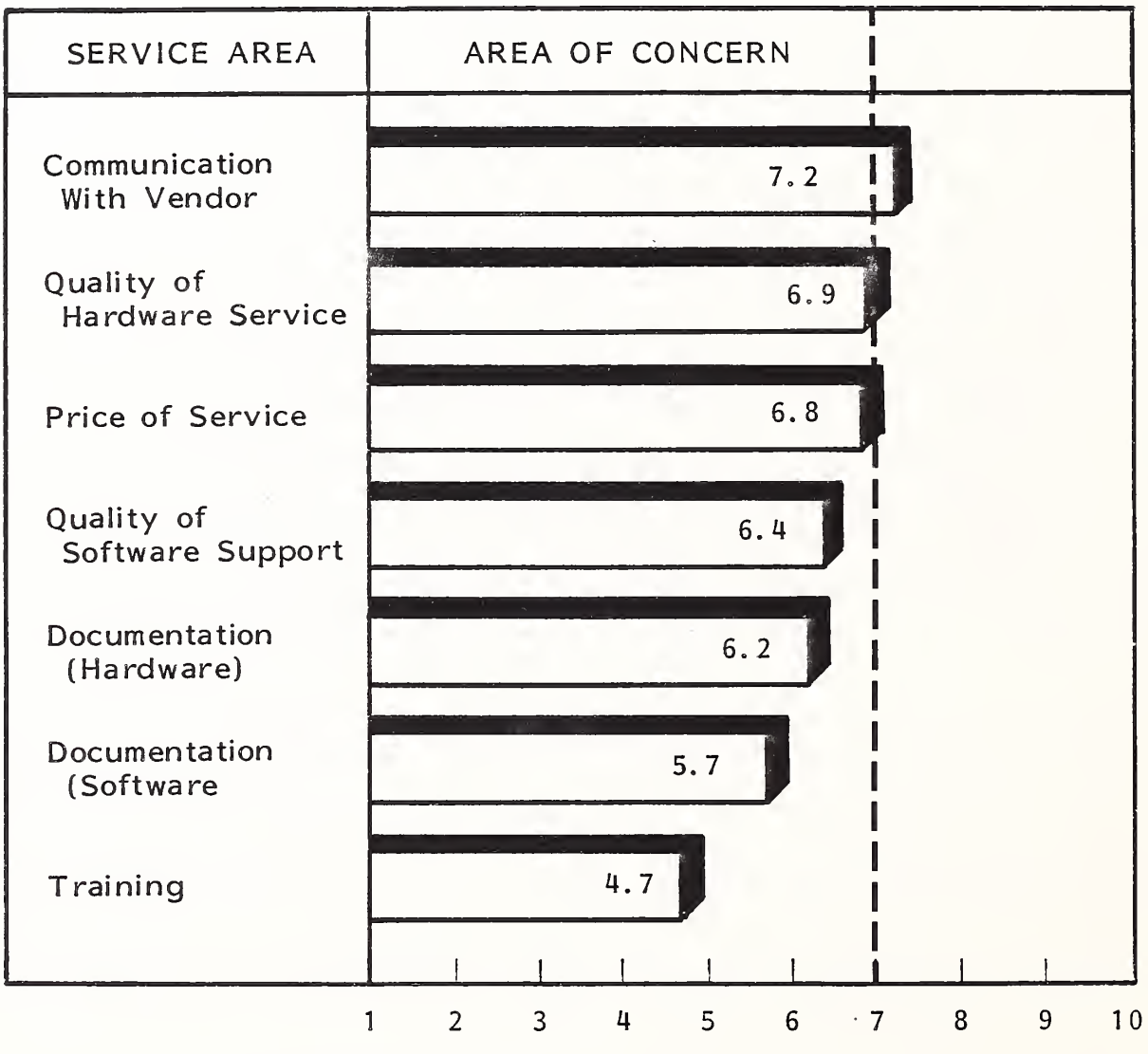


EXHIBIT IV-3

MICROCOMPUTER VENDOR PERFORMANCE
VERSUS INDUSTRY AVERAGE

VENDOR: AT&T

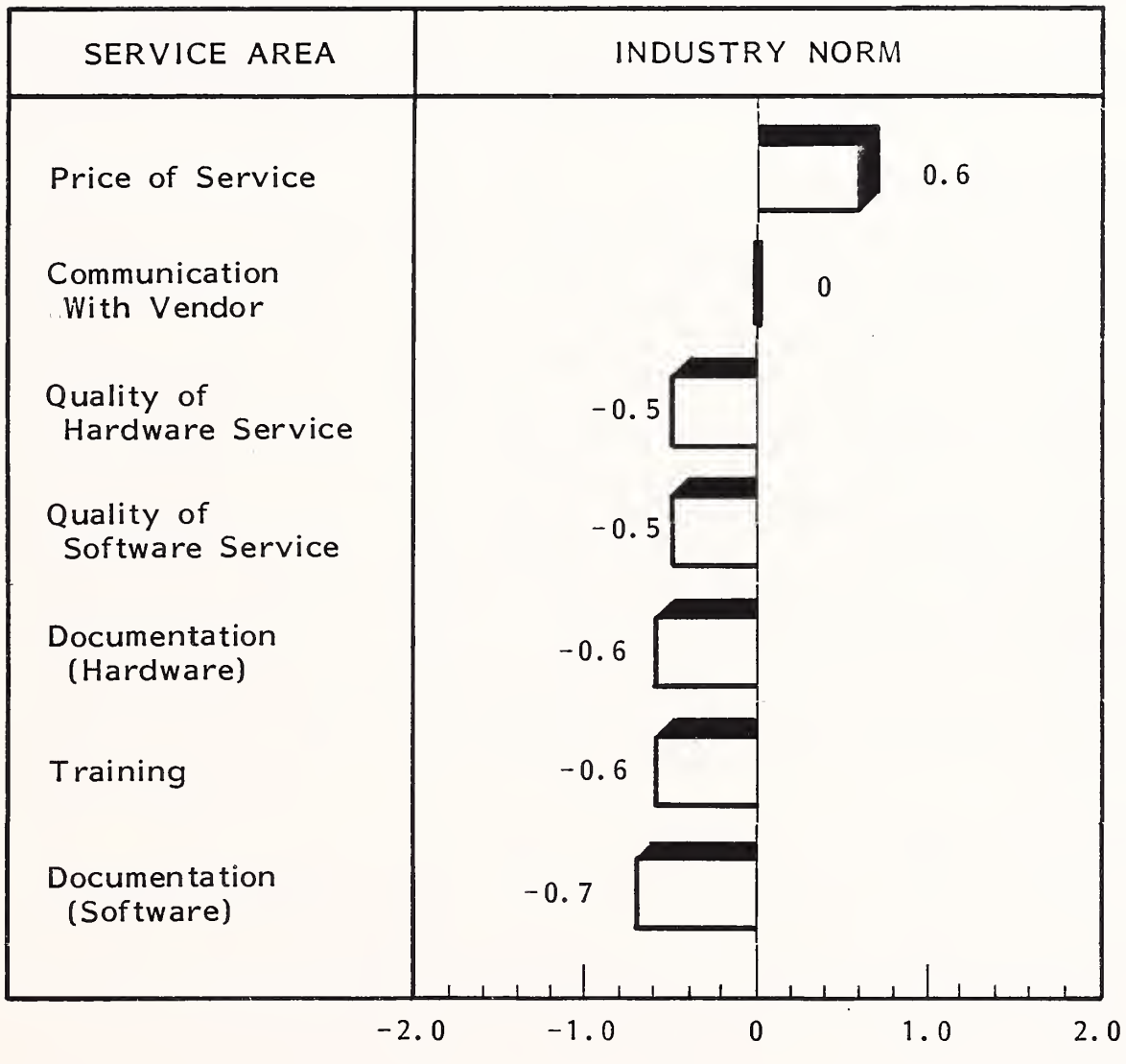


EXHIBIT IV-4

1985 HARDWARE MAINTENANCE PERFORMANCE DATA

VENDOR: AT&T

PERFORMANCE AREA	USER RESPONSE
User Rating Of Hardware Service (Scale 1-10)	6.9
Hours Microcomputer Used Per Day	7.3
System Availability Required (Percent)	91.5%
System Availability Received (Percent)	84.2%
Hardware Failures Per Year	3.1
Hardware Response Time Received (Hours)	6.6
Hardware Repair Time Received (Hours)	5.6

- Since Exhibit IV-5 demonstrates that AT&T's responsiveness in the software support is on par with most other vendors and that the number of software failures per year is also relatively low, the dissatisfaction with software support that these AT&T users report must be heavily weighted by the dissatisfaction the AT&T sample reported with software documentation. This illustrates the importance of software documentation to microcomputer users, who are often faced with performing tasks on new machines that, without proper documentation, result only in misuse and frustration. This also highlights an immediate requirement for increased involvement by AT&T in the design, production, and support of both hardware and software documentation for its PC 6300 and its newer machines.

- Exhibit IV-6 reflects corporate user emphasis for which AT&T targets its machines, with 70% of their sample utilizing on-site coverage for maintenance. The dissatisfaction that AT&T users felt with the quality of their hardware service is reflected by the significant experience with and importance placed upon self-maintenance. Seven of the ten respondents listed responsiveness as their chief service concern, and over half of the sample responded that AT&T should speed up service. Since Exhibit IV-7 indicates that AT&T users are not very willing to increase their involvement in the maintenance of their equipment, the continued dissatisfaction with service and support reported by AT&T users will likely cause them to consider alternative maintenance sources (i.e., third-party maintenance) or alternative microcomputers.

- In AT&T's defense, the PC 6300 is its first attempt in the microcomputer market, and its overall experience as a computer vendor is extremely limited. It is very likely that AT&T service performance will improve as the vendor gains experience in the maintenance and support industry, especially when it can incorporate its telecommunications expertise into its microcomputer offerings. However, AT&T entered the microcomputer market just as the industry was making a significant transition from dealer-supported, depot-delivered maintenance to manufactured supplied, on-site delivered

EXHIBIT IV-5

1985 SOFTWARE SUPPORT PERFORMANCE DATA

VENDOR: AT&T

PERFORMANCE AREA	USER RESPONSE
User Rating of Software Support (Scale 1-10)	6.4
Software Failures Per Year	2.7
Software Response Time Received (Hours)	5.2
Software Repair Time Received (Hours)	8.0

EXHIBIT IV-6

CURRENT MAINTENANCE DELIVERY METHOD

VENDOR: AT&T

SERVICE	PERCENT WHO RECEIVE	REQUIREMENT
User-Self Maintenance	60.0%	6.0
Carry-In	30.8	6.0
On-Site for Micro	70.0	5.9
On-Site for Peripherals	70.0	5.7
Courier	10.0	4.0
Mail-In	10.0	2.5

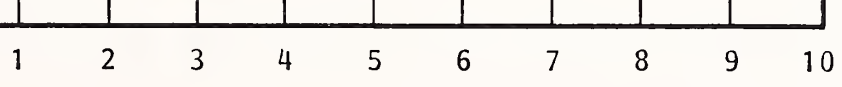


EXHIBIT IV-7

MICROCOMPUTER USER WILLINGNESS TO INCREASE PARTICIPATION IN MAINTENANCE
VENDOR: AT&T

SERVICE	WILLING TO INCREASE PARTICIPATION (Percent)	PERCENT DISCOUNT EXPECTED FOR PARTICIPATION
Carry-In	40.0%	30.0%
Mail-In	30.0	40.0
User Self-Maintenance	30.0	62.5

maintenance and support. Since AT&T is positioning itself in the upper range of business microcomputers, it will have to quickly formulate and deliver maintenance and support that will meet, or perhaps exceed, its users' already high and still-growing service requirements.

V MICROCOMPUTER SERVICE ANALYSIS--APPLE

V MICROCOMPUTER SERVICE ANALYSIS—APPLE

A. PURCHASE CRITERIA

- Historically, Apple Computer has targeted its machines to noncorporate markets, such as education, home, and small business. As a result, sales delivery sources were most often computer specialty and other retail stores. This is reflected in the most common source of service and support, as shown in Exhibits III-1 and III-2, which portray the average Apple service offering as time-and-material (usually depot) maintenance from the purchase source (usually retail).

- In the past, these sources have not emphasized the need or value of service to the user. Instead, ease of use, reliability, and availability of software programs were usually emphasized. This was understandable, since the latter factors usually encouraged sales, while service, which involved unreliability of the equipment, was perceived as a threat to sales.

- Currently, retail outlets are recognizing the importance of support, both as a avenue of increasing sales through improved customer satisfaction and as a source of additional revenue from service contracts and other support sales. While ease of use and equipment reliability are still being stressed, availability of support has become a retail sales factor and an offering that users would soon use as a selection factor.

- Apple relied upon the purchase source as their service deliverers until business users indicated a need for upgraded services in general and on-site maintenance in particular. In order to better serve the business user, Apple responded with two on-site options: the first, on-site delivery through RCA (who had an exclusive third-party maintenance contract with Apple, but who has recently been replaced by Honeywell as the "preferred" third-party maintenance company); and the second, support to large corporate accounts directly from Apple.

- Exhibit V-1 reflects the lowered service requirements of Apple users in terms of relatively low importance of service pricing, service vendor reputation, and availability of a single maintenance source as purchase decision factors. Apple has correctly identified the importance of equipment reliability as a decision factor, and within their selected target markets have the advantage of needing to satisfy lower system availability requirements than most business microcomputer users, as shown in Exhibit III-7.

- Now that Apple is emphasizing corporate America as a target market for their new Macintoshs and networks, it will be interesting to watch how Apple will move to meet the increased service and increased system availability requirements of these users. While equipment reliability will still be a major purchase requirement for users, business users will be less likely to be satisfied with depot and T&M maintenance offerings.

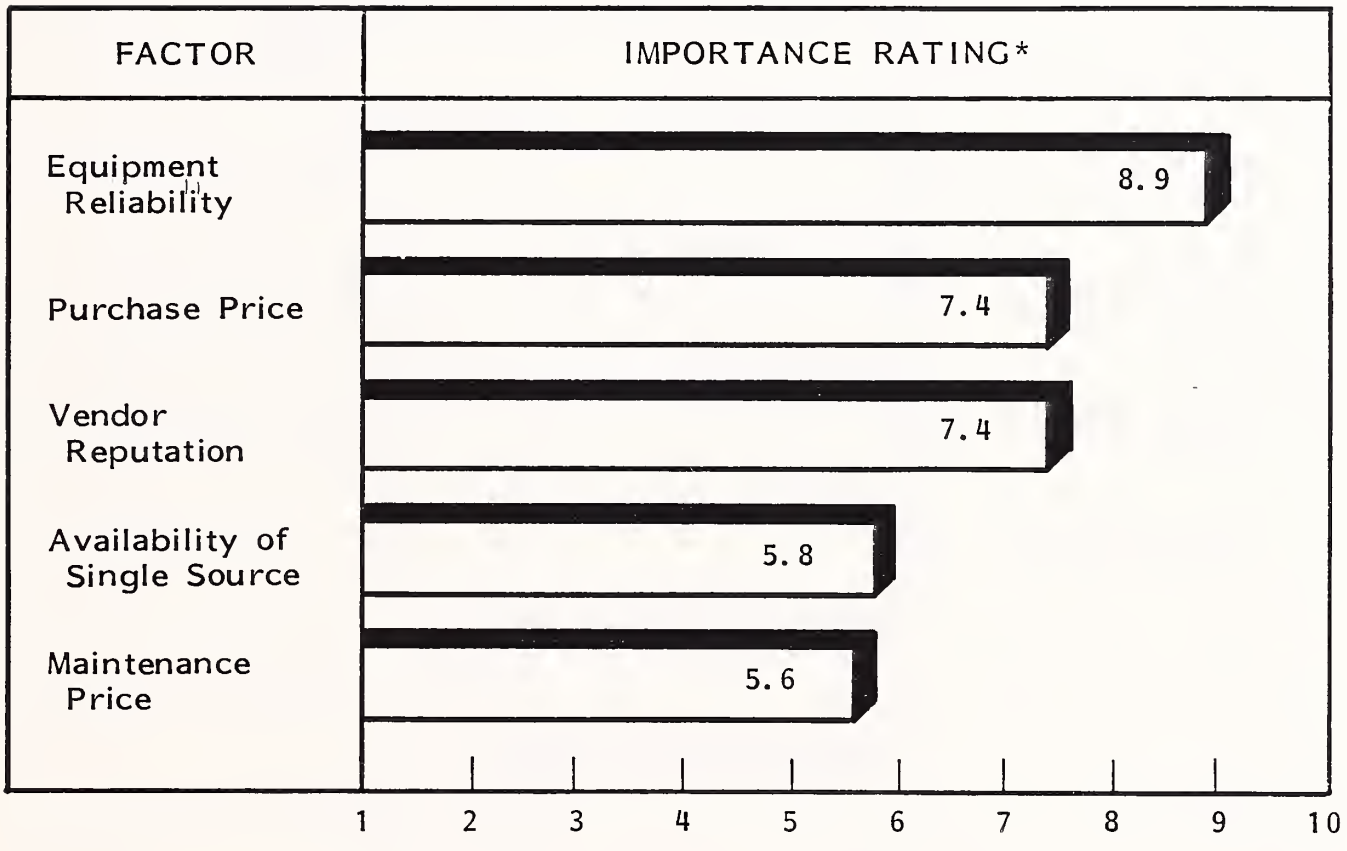
B. USER SATISFACTION WITH SERVICE—APPLE

- Exhibits V-2 and V-3 demonstrate that Apple's micro users are, as a group, fairly satisfied with the quality of service and suport that they receive, with two specific exceptions: price of service and training. The success of Apple's service performance is surprising, considering the lack of emphasis placed upon service. However, Apple has correctly identified the service needs of its

EXHIBIT V-1

IMPORTANCE OF MAINTENANCE FACTORS
IN PURCHASE DECISION

VENDOR: APPLE



* 1 = Low Importance, 10 = High Importance

EXHIBIT V-2

MICROCOMPUTER USER SATISFACTION WITH SERVICE

VENDOR: APPLE

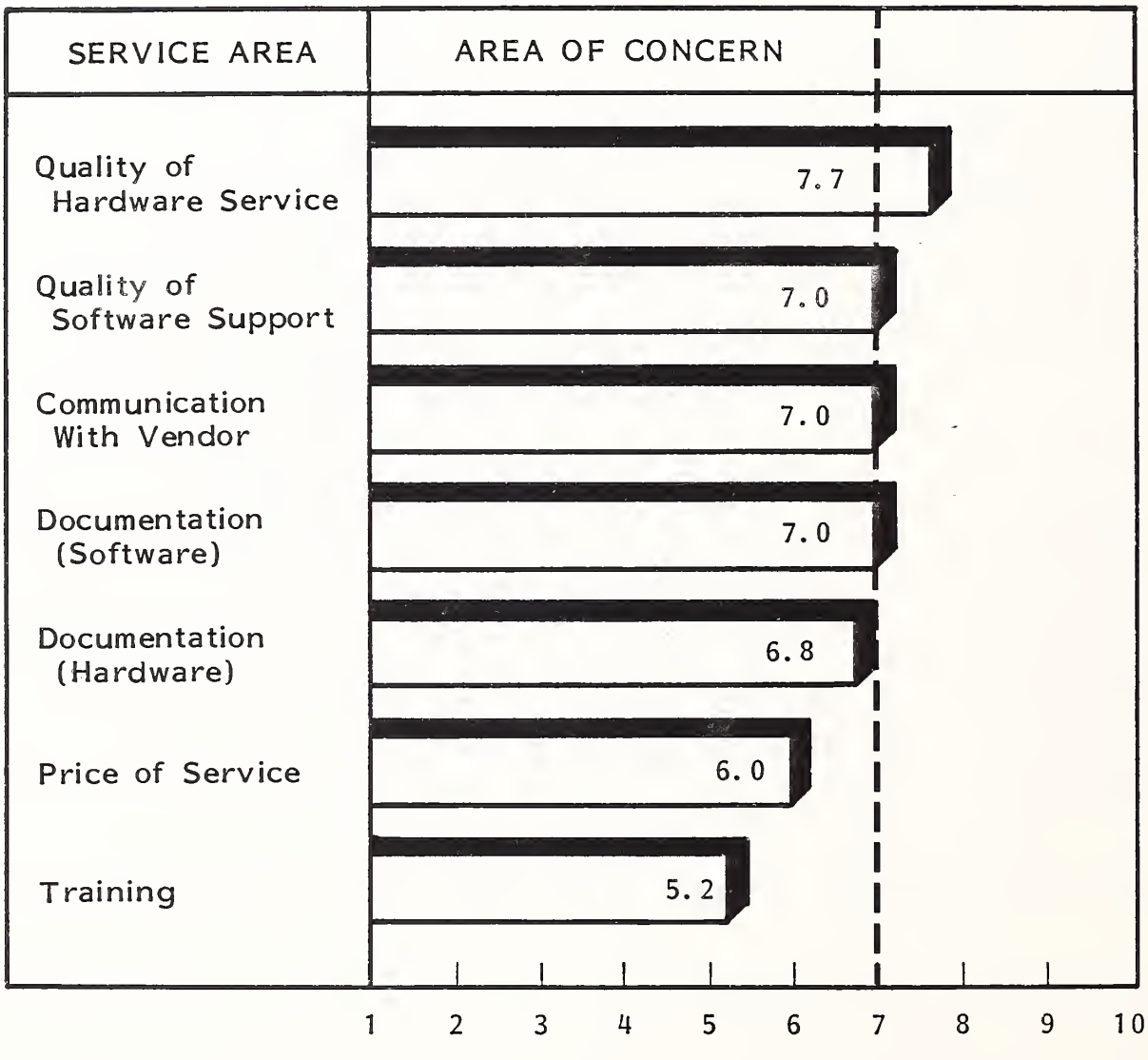
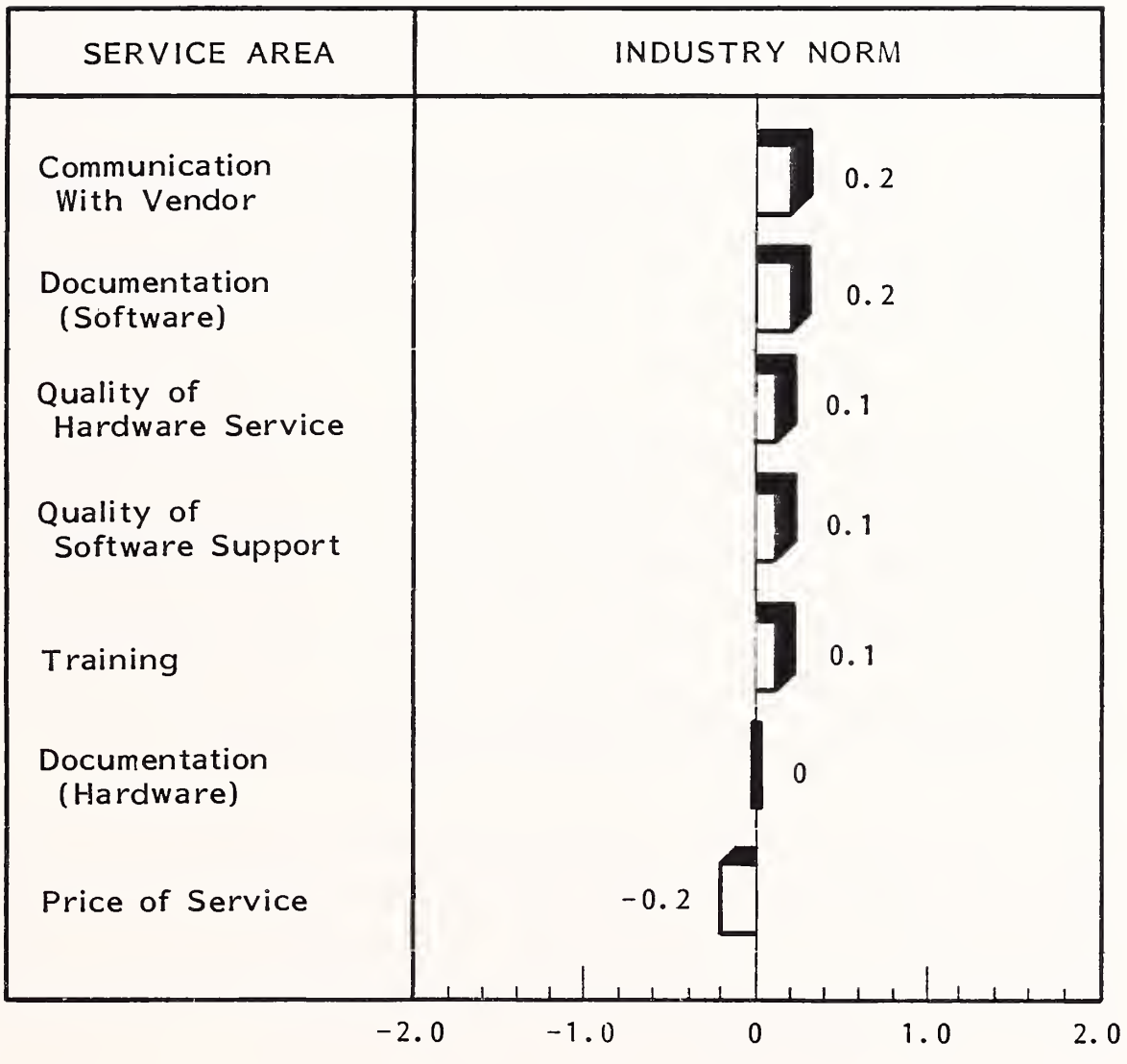


EXHIBIT V-3

MICROCOMPUTER VENDOR PERFORMANCE
VERSUS INDUSTRY AVERAGE

VENDOR: APPLE



main service markets and supplied the amount of service and delivery method that satisfies these needs.

- Key to this understanding of Apple's user service requirement is the low system availability requirement level, shown in Exhibit V-4. This low level is also reflected by a relatively low usage per day. This will no doubt change if Apple succeeds in the larger business market.

- It is significant to note that although Apple stresses the reliability of its equipment, Apple users report that their system availability requirements, low as they may be, are not being met by their vendor. Also, Apple users do not report an average number of system interruptions that is significantly less than any other vendor. This presents an area of concern for Apple users, especially in light of the increased system availability that will be required in the corporate environment.

- Another area that Apple scores well, as shown in Exhibit V-5, is in the area of software support, receiving the best overall rating of all micro users for this service. Again this may be attributed to the lower requirements of its users, but it also reflects the fact that there is a wide range of software available for its computers, much of which is comparatively easy to use. Also, Apple received high marks for documentation, which is a critical service for many small business users, who are quite often computer novices.

- A major area of concern, however, is in the related area of post-sales training, which received a very low mark from almost all micro users. In Apple's case, the low satisfaction that users receive in the area of training highlights the weakness in relying on retailers and TPM organizations as a source of post-sale support.

- As Apple continues to attempt to make inroads into the corporate environment, the key service area that Apple will have to confront is service delivery. Exhibit V-6 shows us that although only 26% of Apple users make

EXHIBIT V-4

1985 HARDWARE MAINTENANCE PERFORMANCE DATA

VENDOR: APPLE

PERFORMANCE AREA	USER RESPONSE
User Rating of Hardware Service (Scale 1-10)	7.6
Hours Microcomputer Used Per Day	4.9
System Availability Required (Percent)	86.9%
System Availability Received (Percent)	82.5%
Hardware Failures Per Year	4.4
Hardware Response Time Received (Hours)	5.6
Hardware Repair Time Received (Hours)	11.4

EXHIBIT V-5

1985 SOFTWARE SUPPORT PERFORMANCE DATA

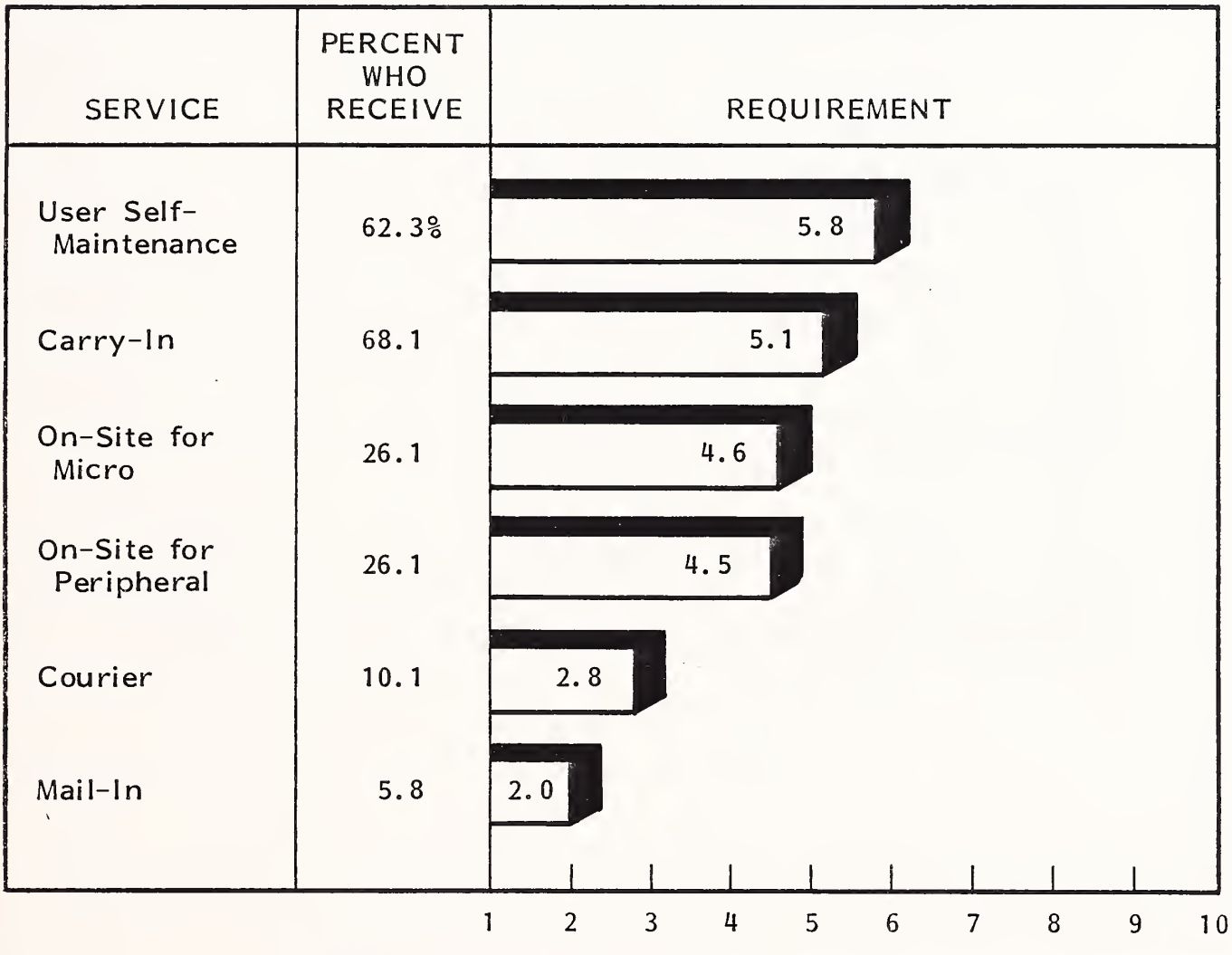
VENDOR: APPLE

PERFORMANCE AREA	USER RESPONSE
User Rating of Software Support (Scale 1-10)	7.0
Software Failures Per Year	2.3
Software Response Time Received (Hours)	7.5
Software Repair Time Received (Hours)	16.8

EXHIBIT V-6

CURRENT MAINTENANCE DELIVERY METHOD

VENDOR: APPLE



use of on-site maintenance, there is a significant and growing requirement for this service. This requirement will be magnified if larger companies take interest in Apple's business offerings.

- An increased emphasis by Apple on an on-site maintenance offering would benefit the company by creating a clear cut, graduated price structure. By providing a clear difference in pricing between the most used service delivery method, depot service, and an upgraded premium delivery method, on-site maintenance, Apple would be able to de-sensitize users to the less-than-premium service price levels. Users unwilling to pay for the premium on-site offering would be more willing to purchase the lower priced depot selections.

- Along with an emphasis on reliability and quality of manufacture, Apple emphasizes the "user-supportability" of their products. In addition to designing micros that do not have a large "footprint" (the amount of space taken up by the computer's dimensions) that would hinder a user from transporting the micro to a service location, Apple attempts to design and lay out the interiors of its system units in a fashion that does not hinder a user from performing simple functions, such as board swaps.

- Exhibit V-7 supports this philosophy, since almost 60% of all Apple users are willing to increase their own involvement in the maintenance of their own machines at a realistic discount.

EXHIBIT V-7

MICROCOMPUTER USER WILLINGNESS TO
INCREASE PARTICIPATION IN MAINTENANCE

VENDOR: APPLE

SERVICE	WILLING TO INCREASE PARTICIPATION (Percent)	PERCENT DISCOUNT EXPECTED FOR PARTICIPATION
User Self-Maintenance	59.5%	39.6%
Carry-In	52.2	25.4
Mail-In	22.1	33.5

VI MICROCOMPUTER SERVICE ANALYSIS--COMPAQ

VI MICROCOMPUTER SERVICE ANALYSIS—COMPAQ

A. PURCHASE CRITERIA

- Compaq's role in the microcomputer market is an unusual one. At the start, Compaq was marketed as a "portable" (now more correctly referred to as a "transportable") version of the IBM PC. Compaq appealed to users who needed IBM-compatibility (to a degree which their competitors could not claim) and desired the ability to move their computer from their desk, conceivably between work and home, or on the road.

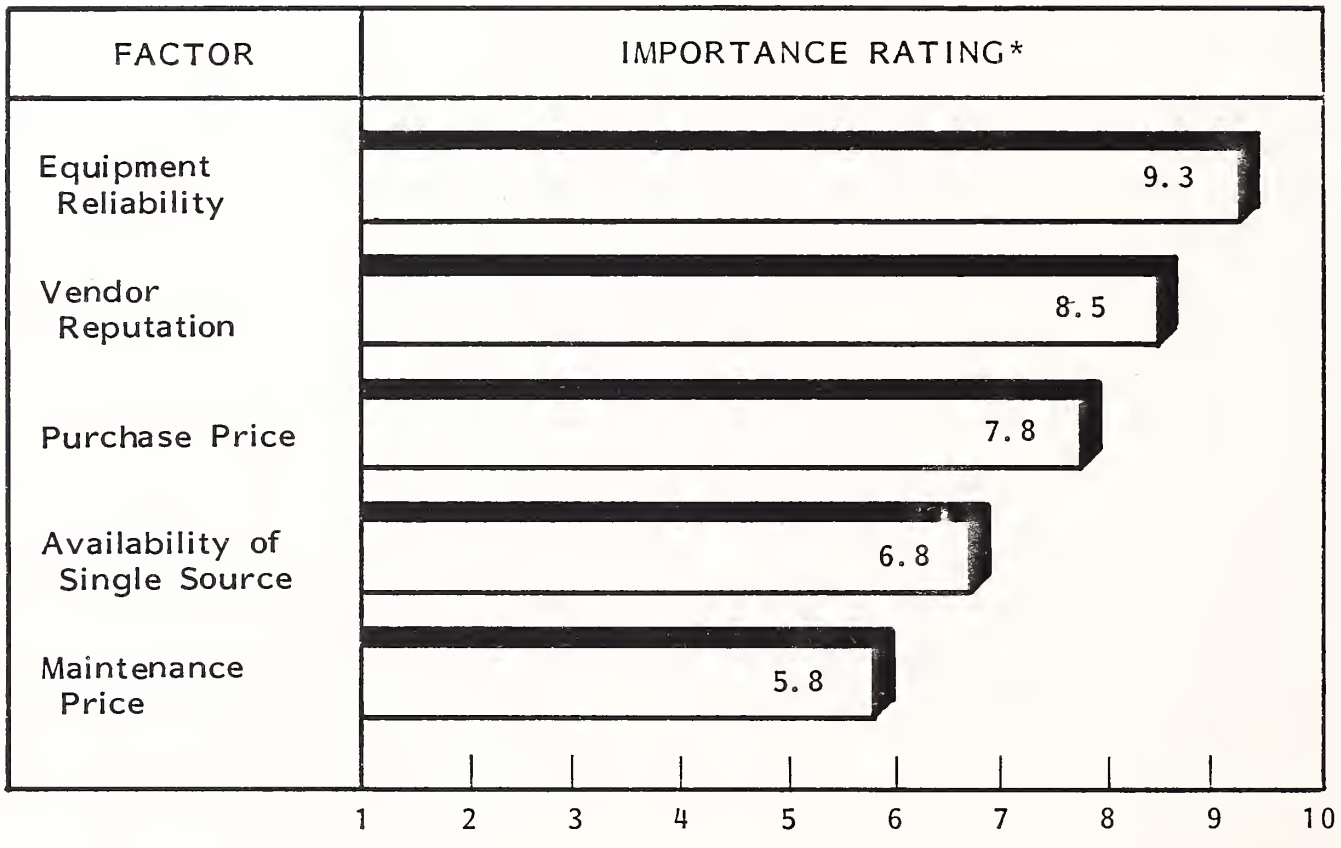
- As is the case of many startup micro companies, Compaq relied on computer-specialty retail stores to provide both sales and service to its customers. This is supported by Exhibit III-1. It would appear that the vast majority of users utilize the closest retail store as a service outlet, usually on a time-and-material basis basis rather than on a contractual arrangement (see Exhibit III-2).

- This indicates that service as a "security blanket" is not a major factor in user selection of Compaq. The low rating that Compaq users reported for maintenance price as a selection criteria, shown in Exhibit VI-1, tends to support this. However, Compaq users do establish a rigid standard in the selection of their micros in that Compaq, perhaps more than any other micro, is compared almost directly against IBM in the following areas:

EXHIBIT VI-1

IMPORTANCE OF MAINTENANCE FACTORS
IN PURCHASE DECISION

VENDOR: COMPAQ



* 1 = Low Importance, 10 = High Importance

- Purchase price, which users rated as 7.8 as a selection criteria versus a 7.3 by IBM users.

- Equipment reliability, which was rated at 9.3 versus 9.0 by IBM users.

- Vendor reputation, which was rated at 8.5 versus 8.1 by IBM users.

- As Compaq attempts to strengthen its position in the corporate office with its DESKPRO family, it will be interesting to see how users change their attitudes toward support as a selection factor, especially when the computer that was so easily carried into a retail store will instead by a more cumbersome desk top machine. Compaq will need to provide the appearance of the same responsive on-site service availability as IBM undoubtedly will provide for their high-end lines.

B. USER SATISFACTION WITH SERVICE—COMPAQ

- As previously shown, the key word for Compaq users, in the area of service, is reliability. Built into this is a need for high-quality repairs of the equipment when service is required. Since the machine is used more often as a secondary machine, with a desk top computer usually considered as the primary computer, responsiveness or timeliness of repairs is less important to users than quality of repairs. Therefore, as long as the micro has relatively few interruptions and as long as a carry-in repair location is fairly close and convenient, it would be safe to say that Compaq users' requirements for service will be comparatively lower than other users, and that these users will be fairly easy to please. This is indicated in Exhibits VI-2 and VI-3, which show that Compaq users are satisfied with the quality of support that they receive from their dealers.

EXHIBIT VI-2

MICROCOMPUTER USER SATISFACTION WITH SERVICE

VENDOR: COMPAQ

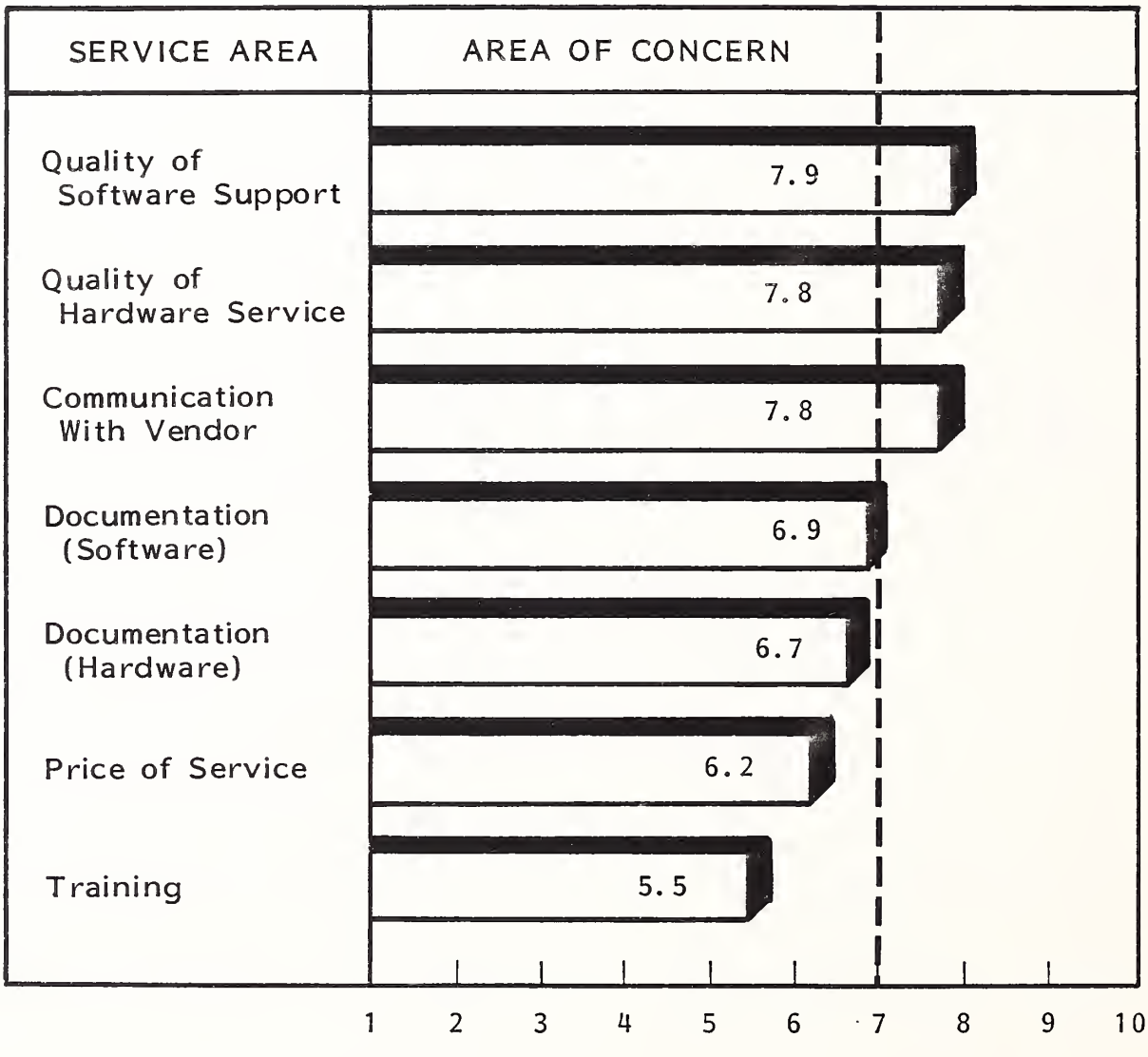
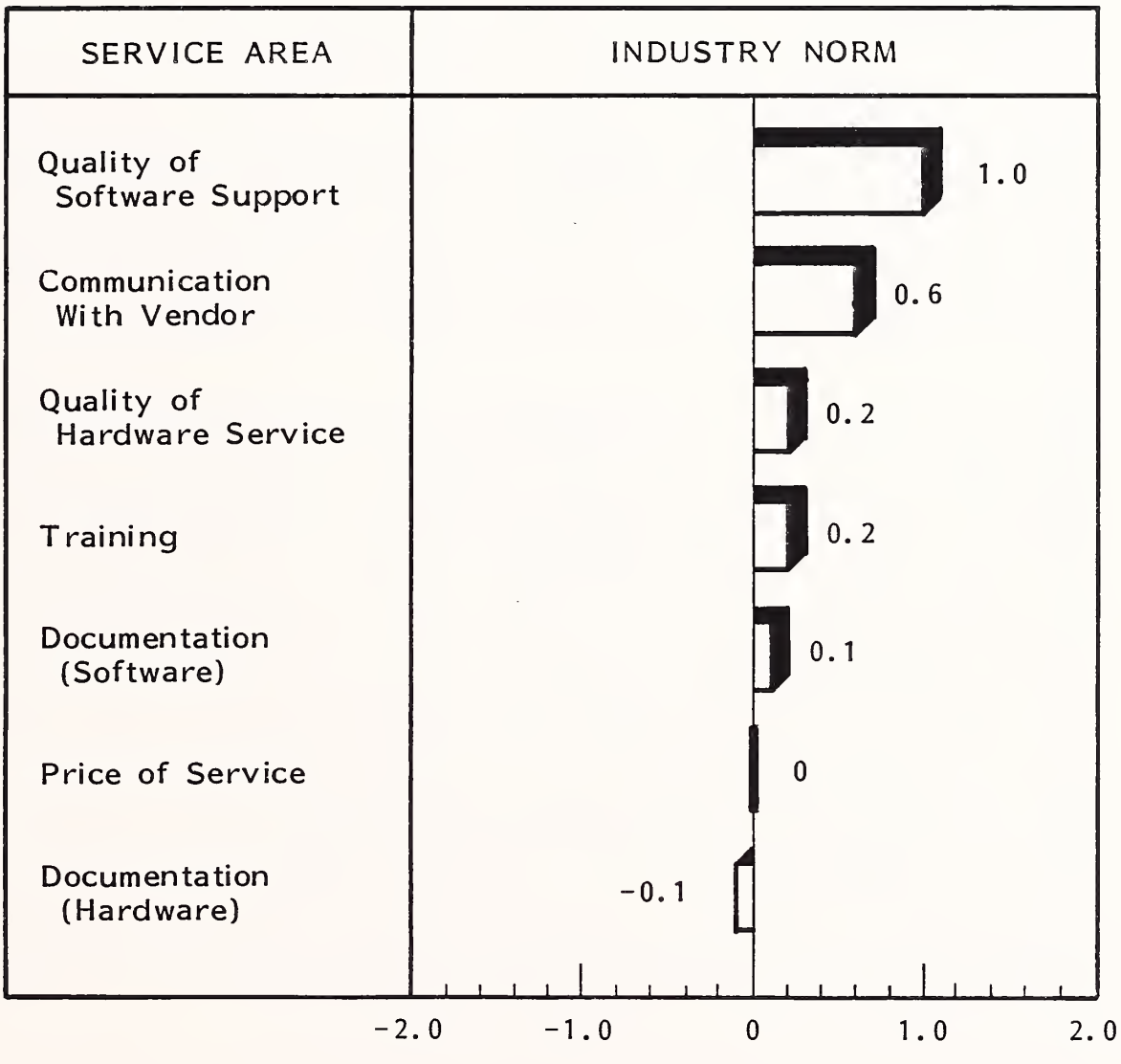


EXHIBIT VI-3

MICROCOMPUTER VENDOR PERFORMANCE
VERSUS INDUSTRY AVERAGE

VENDOR: COMPAQ



- Key areas of strength for Compaq include those that traditionally have been weak spots in microcomputer support--software support, communication with the service vendor, and software documentation. In addition to carefully choosing and supporting their dealer network, Compaq implemented toll-free Customer Information numbers to provide direct support to users. The high satisfaction levels that Compaq users report are significant since a major purchase consideration in the selection of Compaq micros is their PC-compatibility. Therefore, software and software support are very visible to Compaq users.

- Note that as shown in both Exhibits VI-4 and VI-5 Compaq users do not receive particularly fast response or repair times, either for hardware or software, yet Compaq users give high satisfaction ratings for both hardware and software support. Again this reflects the acceptance of depot maintenance by current Compaq users as a satisfactory service delivery method.

- Exhibit VI-4 indicates the emphasis that Compaq users place on product reliability, with a very high system availability requirement of almost 98% uptime. Since system availability is comprised of response time and repair time, this might appear to contradict the lower response and repair time requirements of Compaq users. Instead, the high system availability requirements reflect the usage of the Compaq, not in terms of amount of time used per day (which is relatively small) but in terms of what hours used per day and at what location. Since Compaqs are often used as a second machine, either by someone who is working at home, or by someone who is working on the road, downtime that occurs would render the machine useless since the user would often be without a maintenance source. Again, this emphasizes the importance of product reliability to transportable and portable micro users.

- Exhibit VI-6 demonstrates the current satisfaction that Compaq's portable microcomputer users have with carry-in maintenance, and their relatively low use of, or need for, on-site maintenance. Almost 60% of the users would be willing to increase their own involvement in the maintenance process through

EXHIBIT VI-4

1985 HARDWARE MAINTENANCE PERFORMANCE DATA

VENDOR: COMPAQ

PERFORMANCE AREA	USER RESPONSE
User Rating of Hardware Service (Scale 1-10)	7.8
Hours Microcomputer Used Per Day	4.9
System Availability Required (Percent)	97.9%
System Availability Received (Percent)	92.4%
Hardware Failures Per Year	4.8
Hardware Response Time Received (Hours)	7.9
Hardware Repair Time Received (Hours)	11.3

EXHIBIT VI-5

1985 SOFTWARE SUPPORT PERFORMANCE DATA

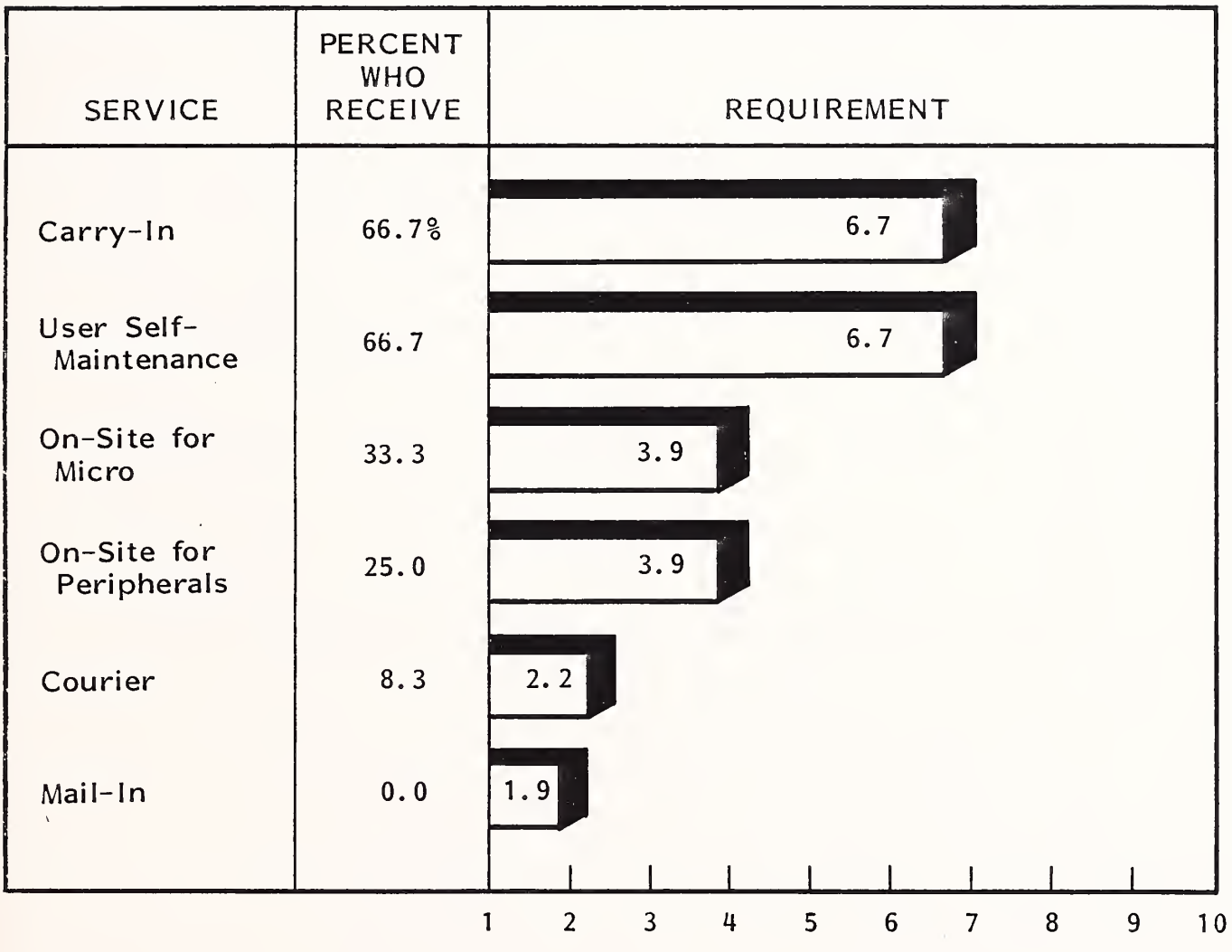
VENDOR: COMPAQ

PERFORMANCE AREA	USER RESPONSE
User Rating of Software Support (Scale 1-10)	7.9
Software Failures Per Year	5.0
Software Response Time Received (Hours)	6.0
Software Repair Time Received (Hours)	18.1

EXHIBIT VI-6

CURRENT MAINTENANCE DELIVERY METHOD

VENDOR: COMPAQ



either the carry-in or self-maintenance process (shown in Exhibit VI-7). This will change as Compaq's product size includes more of their DESKPRO microcomputers, illustrating the importance of segmenting user support needs to fit the changing product size of a particular vendor.

EXHIBIT VI-7

MICROCOMPUTER USER WILLINGNESS TO
INCREASE PARTICIPATION IN MAINTENANCE

VENDOR: COMPAQ

SERVICE	WILLING TO INCREASE PARTICIPATION (Percent)	PERCENT DISCOUNT EXPECTED FOR PARTICIPATION
User Self-Maintenance	58.3	55.0
Carry-In	58.3%	23.0%
Mail-In	25.0	15.0

VII MICROCOMPUTER SERVICE ANALYSIS--DEC

VII MICROCOMPUTER SERVICE ANALYSIS--DEC

A. PURCHASE CRITERIA

- DEC's impact on the microcomputer market has not been as a result of product introductions of any significance, although the release of the Microvax supermicro will certainly interest current VAX users. DEC's treatment of its microcomputer line could be considered confused at best. With their late entrance into a market that was quickly rallying around an IBM standard, DEC's three main micro products, the Rainbow 100, the DECMATE, and the Professional 350, never developed a significant market.

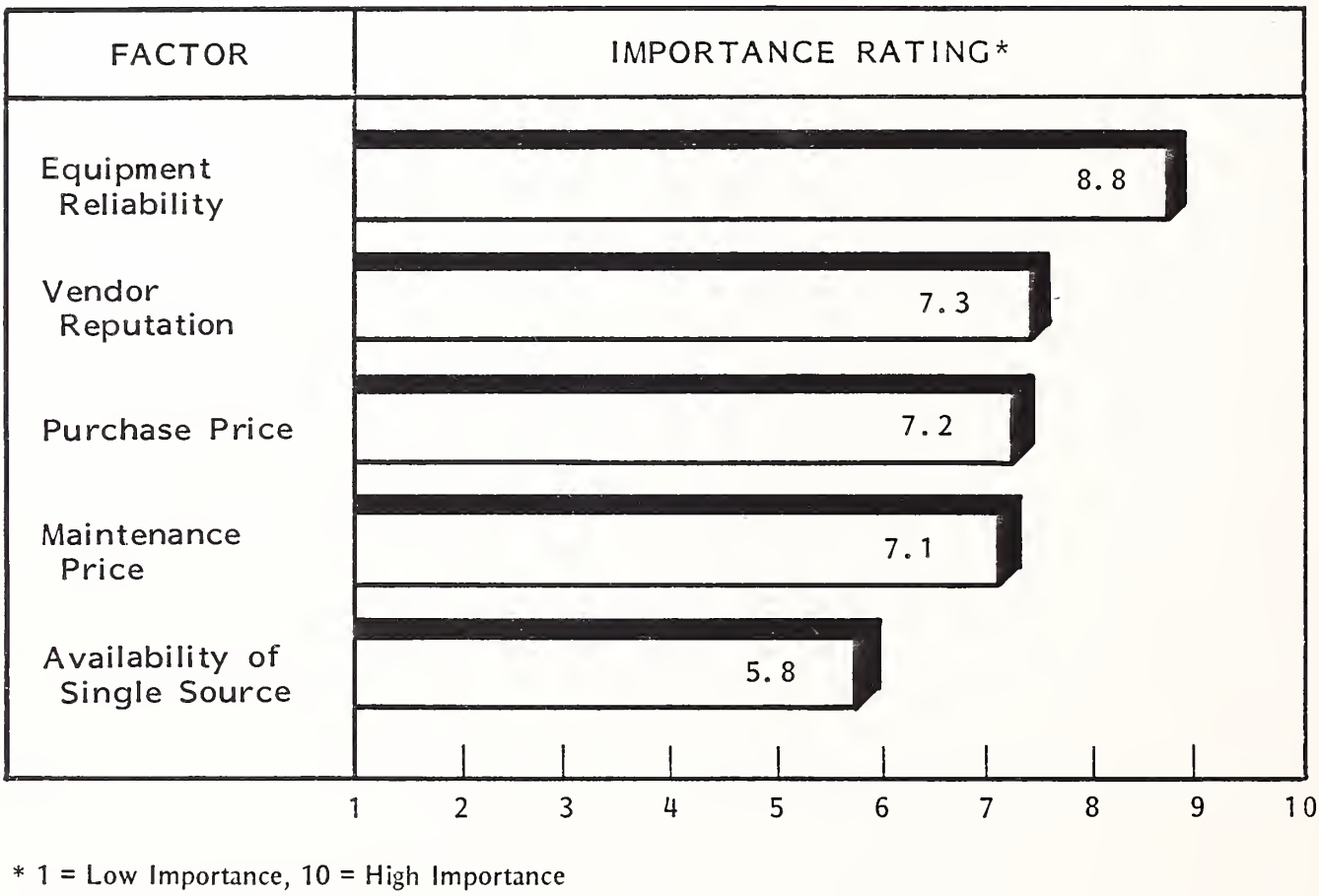
- DEC's importance in the microcomputer market is more a result of the wide range of service offerings available to their micro users. With a catalog of service options that rival many microcomputer vendors, DEC has demonstrated its concern for the continued support of its users, if nothing else.

- It would be accurate to assume that users who chose DEC did so for either one or both of two reasons: desire to stay with DEC due to previous experience, software compatibility, or name recognition; or knowledge of and concern for a high level of service and support. Exhibit VII-1 indicates that service was definitely an issue to DEC micro users, who exhibited one of the highest price-sensitivity marks (second only to Hewlett-Packard users) of any user group.

EXHIBIT VII-1

IMPORTANCE OF MAINTENANCE FACTORS
IN PURCHASE DECISION

VENDOR: DEC



* 1 = Low Importance, 10 = High Importance

- This price sensitivity is (unfortunately) a direct result of the wide range of services available to DEC users. In giving its users a wide range of service levels, DEC allows the users to pick a service level and price level that fits individual needs. In a sense, providing the user the ability to choose from a number of service options creates a form of competition for his service dollar.

- A tremendous benefit results from providing a wide range of service options. It attracts users to service contracts that they might not otherwise be able to afford or didn't previously perceive the value of. We have already seen in Exhibit III-1 that over three-quarters of the DEC sample have a contractual service arrangement with their service vendor, which in almost all cases is DEC.

- Perhaps most significantly, the provision of many service offerings has a dramatic effect on user satisfaction with service, as demonstrated by both DEC and HP users. Users perceive a better communication with service vendors who have service options allowing them to create a service and support policy that fits their needs.

- Of course, users must perceive the value of service and support before a complete service "menu" can effect service satisfaction, since users who do not value service will not usually choose any service option. However, a judicious amount of service marketing, along with the introduction of new service options, will actually raise the value of service in the eyes of users.

B. USER SATISFACTION WITH SERVICE—DEC

- As shown in Exhibits VII-2 and VII-3, DEC users report relatively high service satisfaction levels, given the high service requirements that the DEC users have. Strengths of DEC include communication, software documentation, and hardware maintenance. Weaknesses include price of maintenance, which is

EXHIBIT VII-2

MICROCOMPUTER USER SATISFACTION WITH SERVICE

VENDOR: DEC

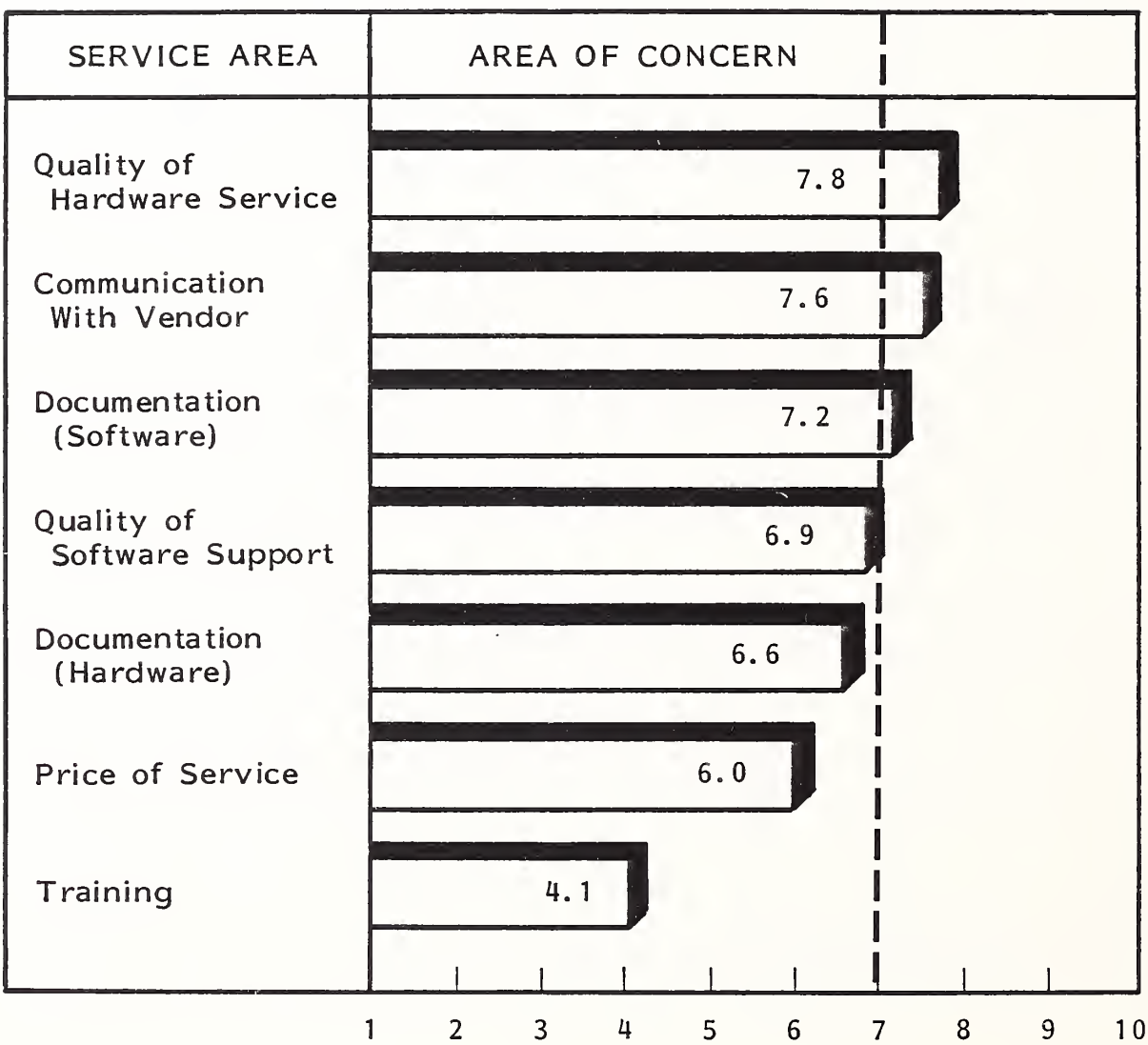
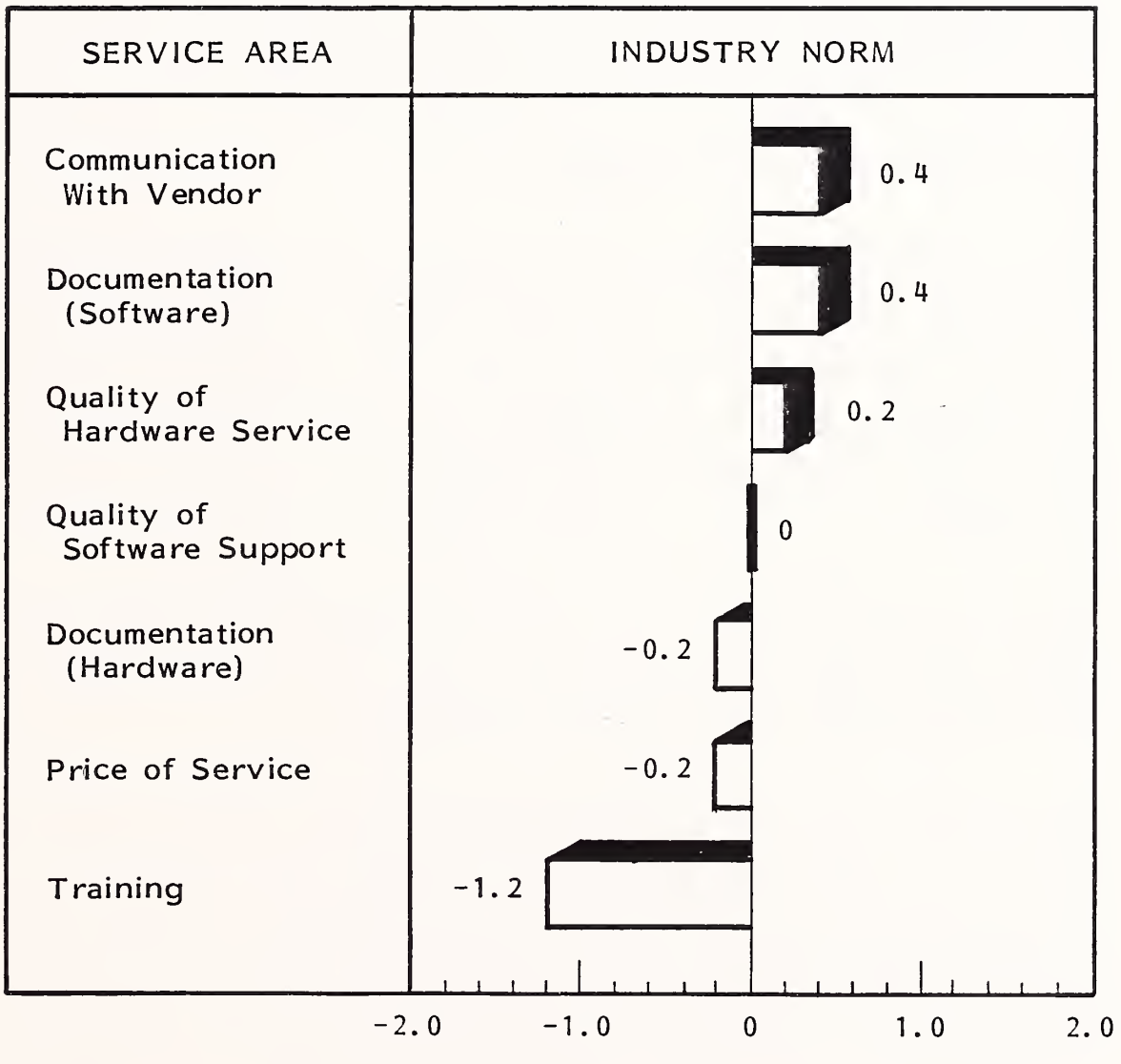


EXHIBIT VII-3

MICROCOMPUTER VENDOR PERFORMANCE
VERSUS INDUSTRY AVERAGE

VENDOR: DEC



not surprising due to the increased price sensitivity of DEC users, and, most significantly, training, which received the lowest rating of all micro users.

- The dissatisfaction that DEC users report concerning training is surprising considering the wide range of training available to DEC users. DEC publishes a catalog of seminar and training sessions for many areas geared to the Rainbow user, including operating system and popular application software usage. One can only surmise that most DEC micro users do not take advantage of the optional courses available, either because they don't know that the courses are available, or they don't value the courses sufficiently to sign up for them. In either case, it indicates that improved marketing of these services is needed at the purchase point.

- DEC's hardware maintenance performance is commendable, considering the high service requirements of their users. As shown in Exhibit VII-4, DEC users use their microcomputer for almost seven hours a day, require 94% system availability, yet receive just under 92% uptime from their micro. Key to this performance is satisfactorily prompt response and repair times for hardware maintenance.

- Software support declines slightly for DEC, as with all other vendors. Exhibit VII-5 indicates that software response time is likely to be the cause of this, with response times that exceed one working day.

- Another sign of the importance that DEC users place upon hardware maintenance is the predominance of users who receive their maintenance on-site, both for the microcomputer and for peripherals attached. Exhibit VII-6 shows that over 46% of all DEC users surveyed receive their maintenance on-site. More significantly, DEC users were the only group of micro users who rated on-site service as their most required delivery method. This is due in large part to the increased acceptance of service by DEC micro users who also use DEC minicomputers. These users have integrated the micro into their larger IS activities, such as terminal emulators, and therefore have greater experi-

EXHIBIT VII-4

1985 HARDWARE MAINTENANCE PERFORMANCE DATA

VENDOR: DEC

PERFORMANCE AREA	USER RESPONSE
User Rating of Hardware Service (Scale 1-10)	7.8
Hours Microcomputer Used Per Day	6.8
System Availability Required (Percent)	94.2%
System Availability Received (Percent)	91.8%
Hardware Failures Per Year	4.6
Hardware Response Time Received (Hours)	5.5
Hardware Repair Time Received (Hours)	7.5

EXHIBIT VII-5

1985 SOFTWARE SUPPORT PERFORMANCE DATA

VENDOR: DEC

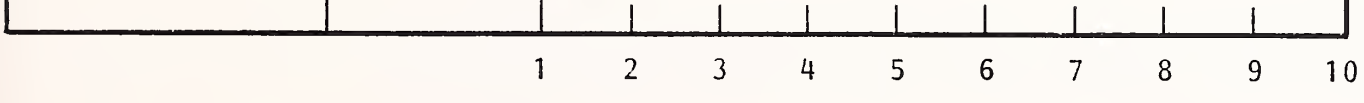
PERFORMANCE AREA	USER RESPONSE
User Rating of Software Support (Scale 1-10)	6.9
Software Failures Per Year	1.5
Software Response Time Received (Hours)	9.4
Software Repair Time Received (Hours)	6.3

EXHIBIT VII-6

CURRENT MAINTENANCE DELIVERY METHOD

VENDOR: DEC

SERVICE	PERCENT WHO RECEIVE	REQUIREMENT
On-Site for Peripherals	46.2%	6.3
On-Site for Micro	46.2	6.2
User Self-Maintenance	61.5	5.6
Carry-In	38.5	5.2
Courier	7.7	2.5
Mail-In	0.0	1.5



ence with and need for service. Additionally, DEC has successfully marketed service to these users by introducing a wide range of support plans and options from which to choose.

- DEC has even catered to the micro user who wishes to cut down on service costs by participating in their own maintenance. Along with providing one of the first and most complete direct catalog sales campaigns, called DECdirect, DEC will even offer microcomputer maintenance training through its catalog of training seminars. Exhibit III-7 illustrates DEC user willingness to increase participation in the maintenance of their microcomputers.

EXHIBIT VII-7

MICROCOMPUTER USER WILLINGNESS TO
INCREASE PARTICIPATION IN MAINTENANCE

VENDOR: DEC

SERVICE	WILLING TO INCREASE PARTICIPATION (Percent)	PERCENT DISCOUNT EXPECTED FOR PARTICIPATION
User Self-Maintenance	53.8%	55.0%
Carry-On	38.5	33.3
Mail-In	15.4	22.5

VIII MICROCOMPUTER SERVICE ANALYSIS--HEWLETT-PACKARD

VIII MICROCOMPUTER SERVICE ANALYSIS—HEWLETT-PACKARD

A. PURCHASE CRITERIA

- Hewlett-Packard's role in the microcomputer market is that of an innovator more than anything else. With a strong background in the scientific and engineering industries, HP has traditionally sought to provide equipment that competes on the high end of the scale, both in performance and price.

- In 1981, HP made its first concerted entrance into the microcomputer market with the HP 120, a dual-Z80 based CP/M-80 machine. Later machines extended the microcomputer lines in both directions, into the lowest-cost environments with the 85B and 86B lines, and into the higher priced, and more vertically marketed industries, with the HP 125 and 9000 micros. In 1984, HP emphasized its strategy in maintaining its position as a industry innovator with two new products in the 100 series, the touch-screen 150 and the lap-top 110.

- While these products did boast IBM-PC compatibility, the emphasis was placed upon innovation, rather than software, and, more significantly, on hardware compatibility. Thus, HP has been slow in capturing a significant share of the market with these new products, while its older machines have either been discontinued or are in the process of being phased out.

- Since the business world has yet to demonstrate significant acceptance of the 150 or the 110, INPUT has included users of the 85 and older 100-series computers, which HP has committed to support for five years after discontinuation.

- In many respects, HP is similar to DEC in the microcomputer industry. Both vendors' strength lies in the minicomputer market. Both companies view their microcomputers as an important part of an integrated solution to office computing. Both rely on innovation or name recognition as a selling point, with PC-compatibility only secondary. And both companies, perhaps a result of their experience in the minicomputer markets, stress the importance and availability of on-site maintenance and a full-service "menu."

- In doing so, both vendors face high user service requirements for their machine, but both vendors are up to the task. This is especially true of HP.

- Exhibit VIII-1 indicates the importance that users place on service aspects in the selection of their microcomputers. Note that equipment reliability is an extremely high reliability requirement of HP micro users, not surprising due to HP's past emphasis on the engineering and scientific applications.

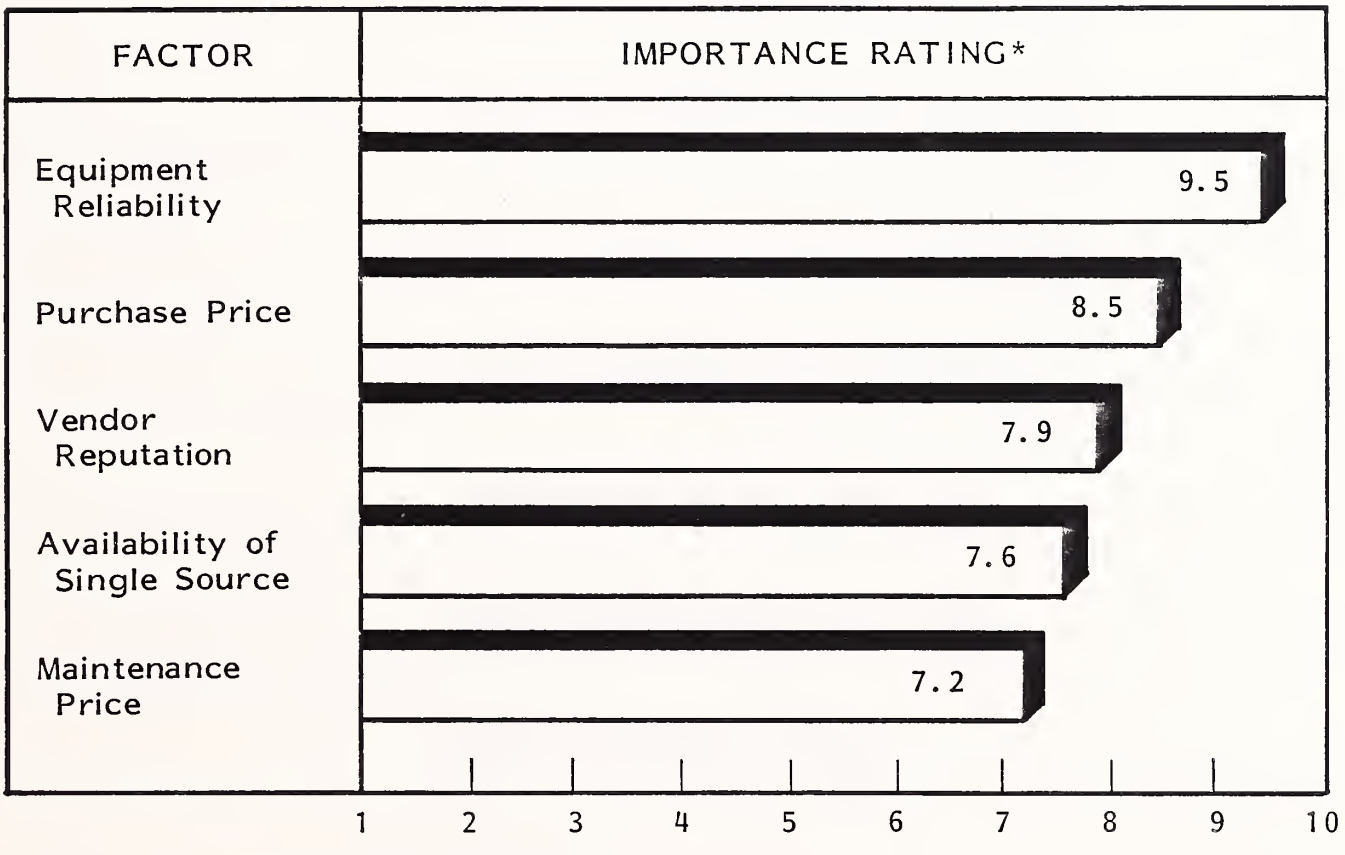
- HP has had success in conveying the importance of a single source of maintenance to its users. This has helped HP deliver manufacturer-supplied maintenance to 93% of its user sample, and provides HP with the control of quality of service, resulting in increased user satisfaction with maintenance and eventually in increased sales. Moreover, it has provided HP with a controlled source of continual service revenues, which will become considerable if HP begins to take an increased share of the business microcomputer market.

- It is important to note that for both DEC and HP a relatively small market share makes it easier to provide direct support. However, both companies also have advantage of existing service and support locations, along with the added retail and dealer distribution locations, as service distribution points.

EXHIBIT VIII-1

IMPORTANCE OF MAINTENANCE FACTORS
IN PURCHASE DECISION

VENDOR: HEWLETT-PACKARD



* 1 = Low Importance, 10 = High Importance

Also, both vendors see the benefits of a heavily marketed, complete menu of service options.

B. USER SATISFACTION WITH SERVICE—HP

- Given HP's emphasis on service, it is not surprising that HP users report high satisfaction levels in almost areas, as shown in Exhibits VIII-2 and VIII-3. Areas where HP users report the highest satisfaction rates include price of maintenance, hardware documentation, and software documentation.

- It is important to note that although HP users are relatively price-sensitive toward maintenance (as shown in Exhibit VIII-1), they are comparatively happy about their service price levels. This is a result of not only the high satisfaction levels with their service that they receive but also of the higher perceived value they have as users toward service. This higher perceived value results from the effective service marketing HP has accomplished, both in terms of presentation and selection of available services.

- Of even greater importance to most microcompute users is the quality of documentation for both hardware and software. Since a significant number of micro users are "computer illiterate," documentation and training becomes vital not only in improving user satisfaction, but also in reducing downtime caused by user misuse of the computer. Many HP users commented on the clarity of HP's documentation, especially compared to similar packages from other vendors. This highlights the importance of reviewing and editing documentation, both in-house and third-party developed, within the service organization.

- Exhibit VIII-4 helps explain HP user satisfaction with service. HP users report the highest system availability of any of the leading micro user samples, high enough to exceed users' relatively high system availability requirements. Key

EXHIBIT VIII-2

MICROCOMPUTER USER SATISFACTION WITH SERVICE

VENDOR: HEWLETT-PACKARD

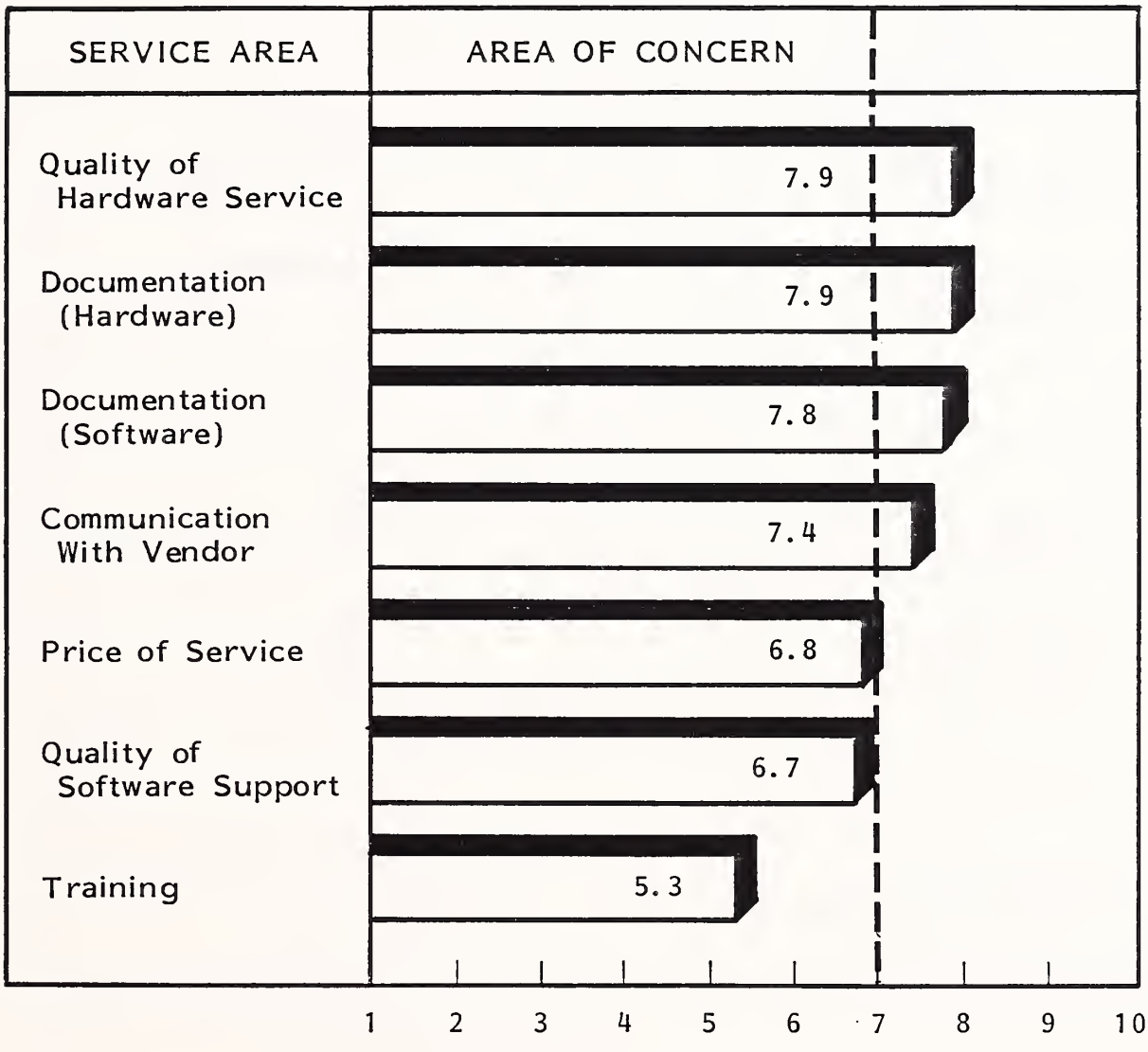


EXHIBIT VIII-3

MICROCOMPUTER VENDOR PERFORMANCE
VERSUS INDUSTRY AVERAGE

VENDOR: HEWLETT-PACKARD

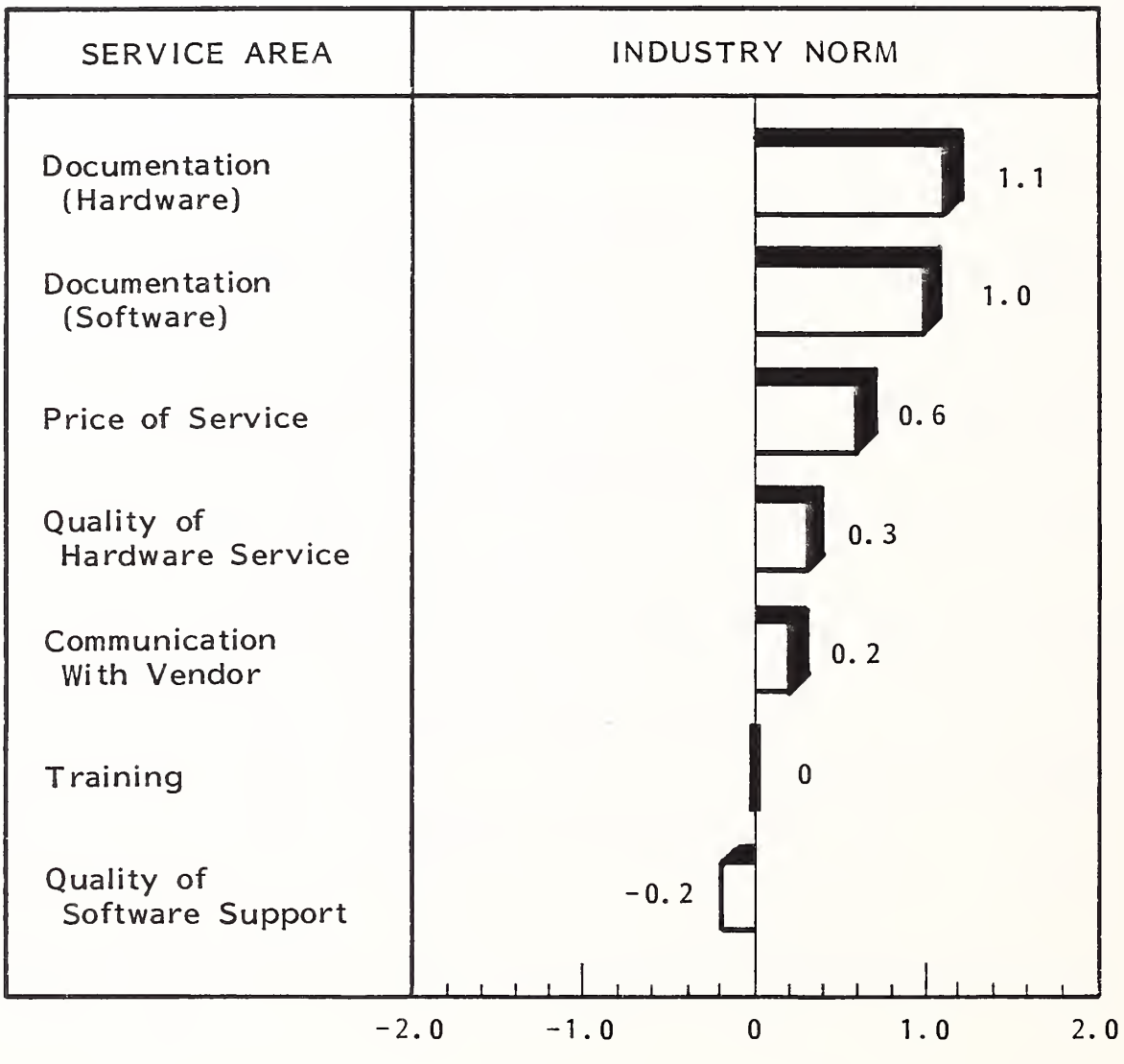


EXHIBIT VIII-4

1985 HARDWARE MAINTENANCE PERFORMANCE DATA

VENDOR: HEWLETT-PACKARD

PERFORMANCE AREA	USER RESPONSE
User Rating of Hardware Service (Scale 1-10)	7.9
Hours Microcomputer Used Per Day	4.9
System Availability Required (Percent)	94.6%
System Availability Received (Percent)	96.2%
Hardware Failures Per Year	2.8
Hardware Response Time Received (Hours)	8.7
Hardware Repair Time Received (Hours)	8.0

to this is the quality of workmanship and reliability of the machines, which experience less than three hardware-related interruptions per year. In this regard, HP has reduced the need for immediate response and repair times by reducing the need for service calls, both by improving manufacturing quality and by improving documentation.

- The improved documentation has also helped improve software performance. Exhibit VIII-5 indicates that HP users reported less than one software failure per year, due in part to the quality of software and in part to the high quality of software documentation. Again, the importance of responsiveness is lessened by the reliability of the product combined by the support given to the user through documentation.

- Exhibit VIII-6 shows that, as with DEC, the majority of HP micro users utilize on-site maintenance offerings for their systems. Again, as is the case with DEC users, HP micro users place a relatively high requirement level for on-site service.

- A large proportion of the HP users, 78.6% of the sample, would be willing to increase their involvement in maintaining their own equipment. Since the discount expected for this increased involvement is relatively small, 33% of the on-site contract price as shown in Exhibit VIII-7, and since users indicate that documentation for the HP micros is of high quality, this option should be pursued further by the vendor.

EXHIBIT VIII-5

1985 SOFTWARE SUPPORT PERFORMANCE DATA

VENDOR: HEWLETT-PACKARD

PERFORMANCE AREA	USER RESPONSE
User Rating of Software Support (Scale 1-10)	6.7
Software Failures Per Year	0.9
Software Response Time Received (Hours)	8.2
Software Repair Time Received (Hours)	9.1

EXHIBIT VIII-6

CURRENT MAINTENANCE DELIVERY METHOD

VENDOR: HEWLETT-PACKARD

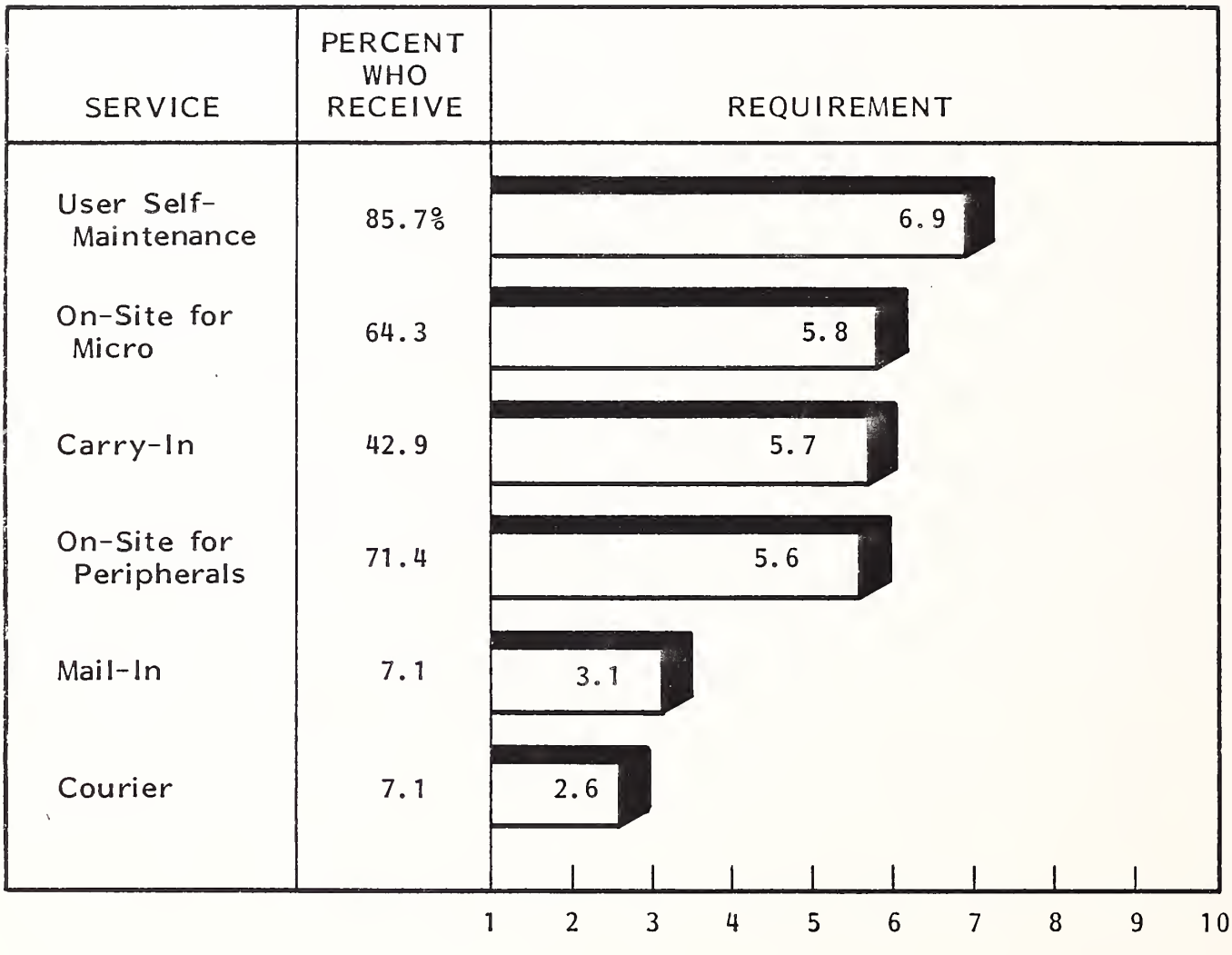


EXHIBIT VIII-7

MICROCOMPUTER USER WILLINGNESS TO
INCREASE PARTICIPATION IN MAINTENANCE

VENDOR: HEWLETT-PACKARD

SERVICE	WILLING TO INCREASE PARTICIPATION (Percent)	PERCENT DISCOUNT EXPECTED FOR PARTICIPATION
User Self-Maintenance	78.6%	32.8%
Carry-In	42.9	21.3
Mail-In	28.6	35.0

IX MICROCOMPUTER SERVICE ANALYSIS--IBM

IX MICROCOMPTER SERVICE ANALYSIS—IBM

A. PURCHASE CRITERIA

- When IBM entered the microcomputer market in 1981, it signaled to the world that it felt the microcomputer was a legitimate tool for the business user, thus creating the business market we are now analyzing. IBM quickly established control of the market, and with ongoing product introductions, such as the recent IBM PC AT, will continue to distance itself from the other vendors, who will either have to appeal to specific vertical markets or applications or jump on the "me too" PC-compatible bandwagon.

- This control was accomplished by appealing to a business market which already recognized IBM as the leading computer manufacturer. By utilizing its existing strengths in marketing, sales, support, and name recognition, and by encouraging third-party software development, IBM was able to gain much momentum in advancing to the forefront of the business market. By incorporating an unusual (for IBM) amount of outside help in the manufacturing and distribution of its PCs, IBM took control of the overall microcomputer market in less than three years.

- In keeping with its strategy of initial independent support of its microcomputer products, IBM relied chiefly on its dealer network to provide most of the maintenance and support for its products. This is now changing, as both the business market and IBM recognized the importance of manufacturer's support to the business user.

- It is no surprise that name recognition would rate high, as shown in Exhibit IX-1, as a purchase criteria to IBM micro users. IBM business users, particularly in corporate IS, recognize the IBM logo as one that represents quality and, even more important, support. Consequently, both purchase price and maintenance price became relatively unimportant to IBM users, who were as much sold by the three initials on the machine as any price/performance criteria.

- Note the low requirement that IBM micro users place upon the availability of a single source of maintenance. This reflects the past reliance by IBM on their dealer network in providing support for IBM's micros and the rise of third-party maintenance companies, such as TRW and Sorbus, who sprang upon the rapidly expanding business microcomputer market as it developed into a wide-open service market. It should be noted that for no other product line are IBM users so casual toward single-source maintenance, and that with the continued movement by IBM in providing direct support for its corporate customers, this decision criteria will soon gain in importance.

B. USER SATISFACTION WITH SERVICE—IBM

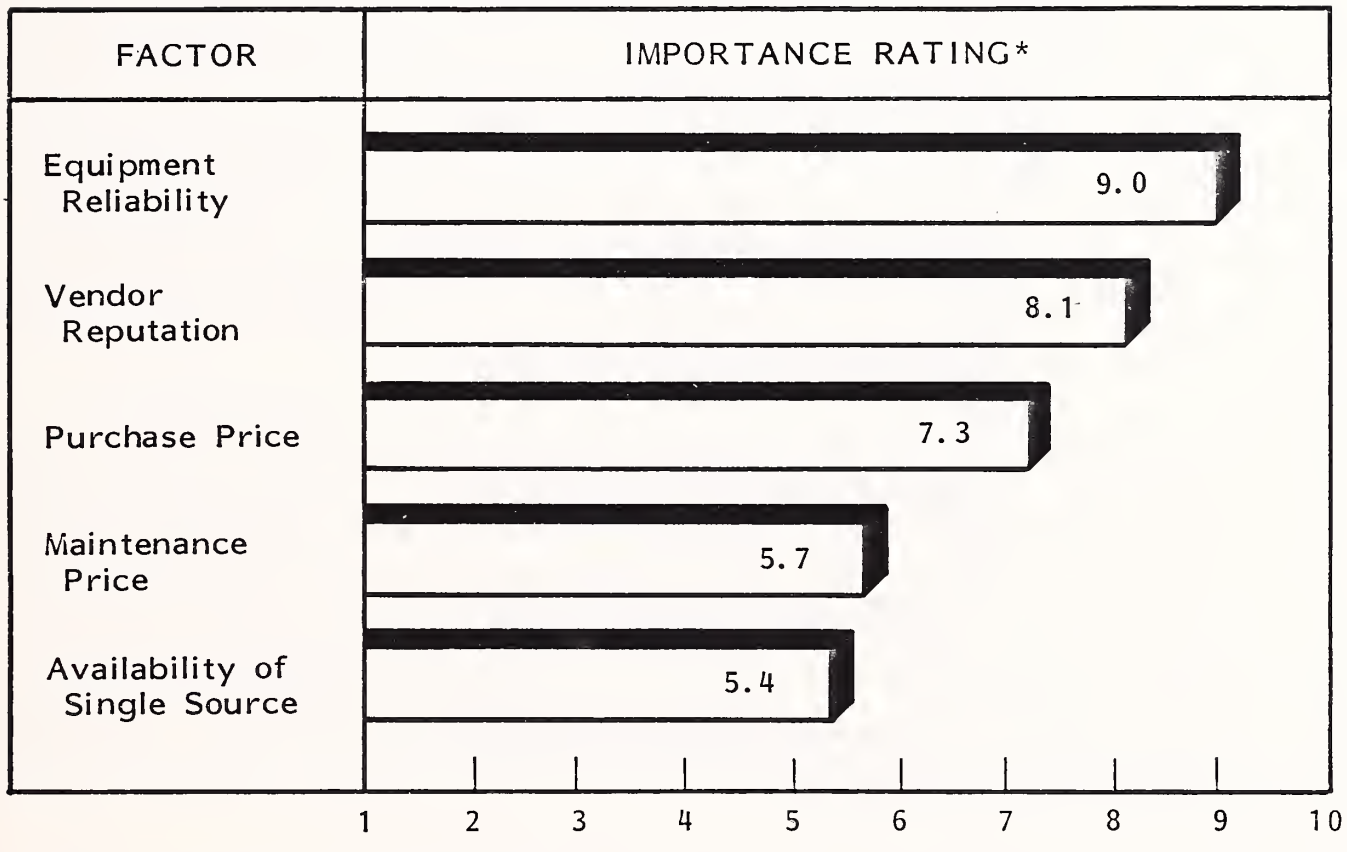
- Customer satisfaction has been a traditional strength at IBM. Not only does it benefit from name recognition as a support leader, but IBM has also demonstrated an exceptional ability to evaluate and then satisfy the service and support needs of its user base at levels that increase user satisfaction while still remaining profitable.

- When IBM entered the microcomputer market, it realized that even it could not effectively distribute and support the dispersed user base that would result from the successful introduction of its PC. Instead IBM utilized computer retail stores, along with its own IBM Product Centers, as distribu-

EXHIBIT IX-1

IMPORTANCE OF MAINTENANCE FACTORS
IN PURCHASE DECISION

VENDOR: IBM



* 1 = Low Importance, 10 = High Importance

tion and service locations. Gradually, IBM incorporated its own direct sales and service mechanism into its business microcomputer network.

- Exhibits IX-2 and IX-3 demonstrate the success that IBM has had in evaluating what the business microcomputer market needs in the areas of maintenance and support and in providing satisfaction levels that coincide with the industry norms. Note in Exhibit IX-3 that IBM stays fairly close to micro sample norm in all service areas.

- IBM performs the best of all micro vendors surveyed in the area of training. This is surprising, due to the constantly changing responsibility of end-user training. Originally, all microcomputer end-user training was the responsibility of the purchase source, usually a computer-specialty retail store. In 1984, IBM offered training courses out of selected IBM product centers, but given by independent training companies. Eventually IBM will need to take a more direct role in the training of its users, especially as its more advanced products, such as the PC AT, 370/XT, and PC 3270 become the standard within the corporation.

- The change in IBM's product base, from predominantly PC to more advanced micro products, will increase the user service requirements in all service areas. It can be expected that the IBM micro usage, shown in Exhibit IX-4, would most likely rise to the levels of current small systems, especially networked systems. In the same vein, although system availability requirements might not rise measurably, user acceptance of system availability below this level will diminish.

- Software support, traditionally a strength of IBM, is only adequate according to IBM users. Response and repair times are a little better than the industry average, as shown in Exhibit IX-5; however, software documentation continues to be a soft spot in the users eyes. IBM will need to strengthen its influence over third-party software documentation design and production. Also, IBM's increased activity in the design and distribution of its own software packages for its microcomputers will result in improved documentation.

EXHIBIT IX-2

MICROCOMPUTER USER SATISFACTION WITH SERVICE

VENDOR: IBM

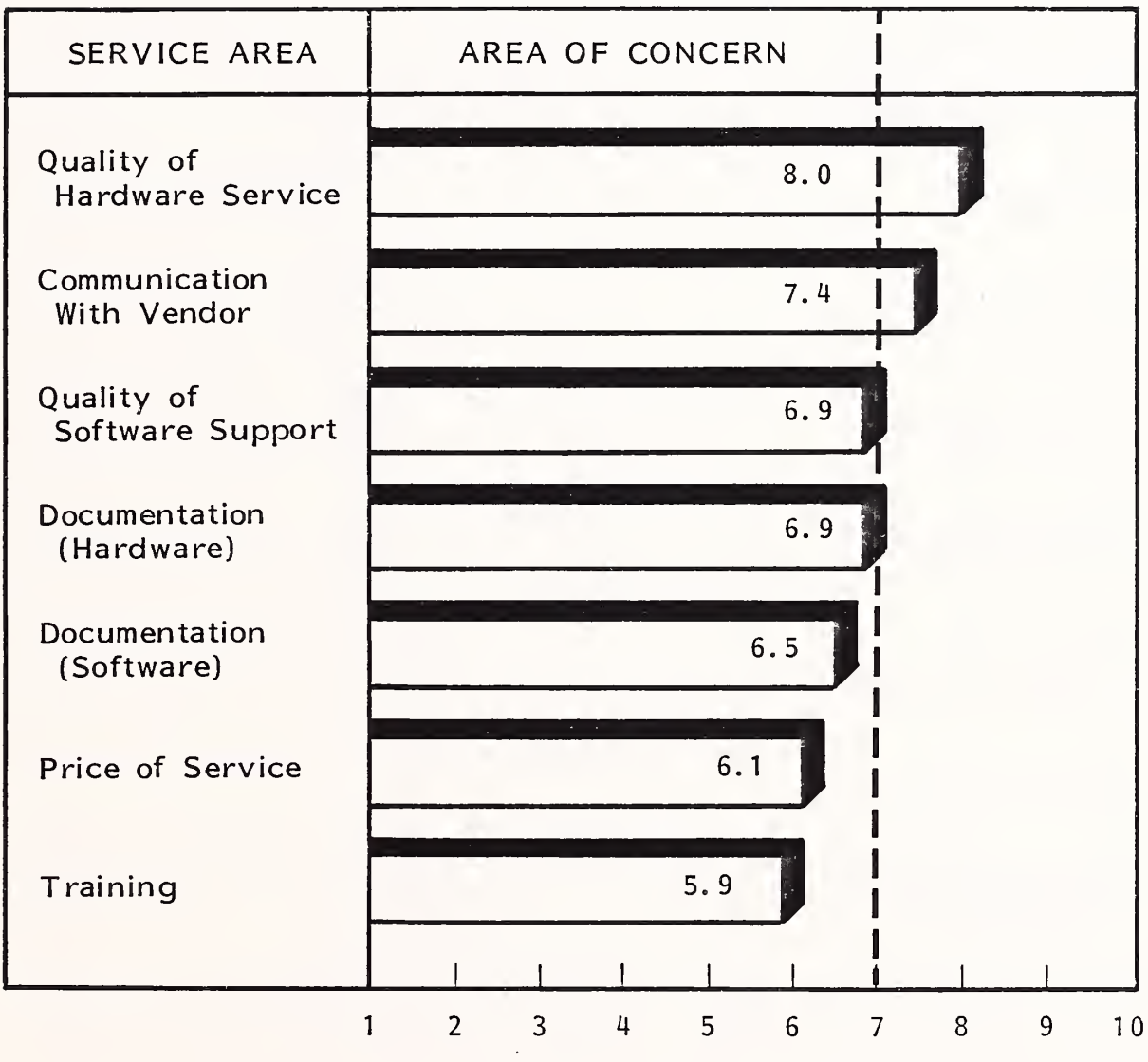


EXHIBIT IX-3

MICROCOMPUTER VENDOR PERFORMANCE
VERSUS INDUSTRY AVERAGE

VENDOR: IBM

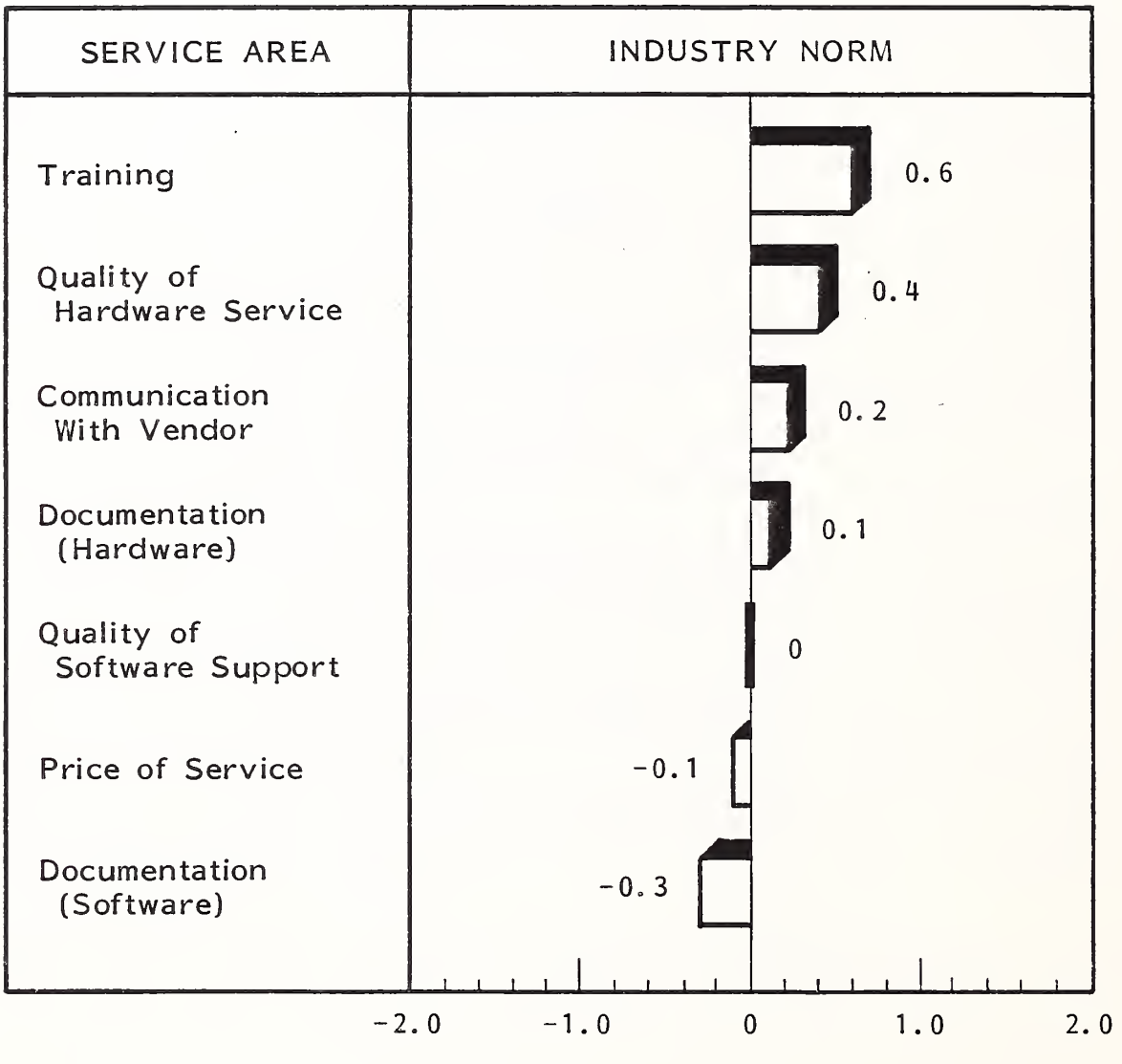


EXHIBIT IX-4

1985 HARDWARE MAINTENANCE PERFORMANCE DATA

VENDOR: IBM

PERFORMANCE AREA	USER RESPONSE
User Rating of Hardware Service (Scale 1-10)	8.0
Hours Microcomputer Used Per Day	4.4
System Availability Required (Percent)	94.7%
System Availability Received (Percent)	91.7%
Hardware Failures Per Year	4.4
Hardware Response Time Received (Hours)	4.9
Hardware Repair Time Received (Hours)	9.4

EXHIBIT IX-5

1985 SOFTWARE SUPPORT PERFORMANCE DATA

VENDOR: IBM

PERFORMANCE AREA	USER RESPONSE
User Rating of Software Support (Scale 1-10)	6.9
Software Failures Per Year	2.3
Software Response Time Received (Hours)	6.2
Software Repair Time Received (Hours)	7.7

- In order to improve user satisfaction with software support, IBM has introduced a number of support options for its national accounts microcomputer customers who purchase 20 or more units. These customers are handled by a Volume Purchase Agreement (VPA), which entitles large volume users to a number of service benefits. IBM makes available to volume purchasers access to a menu-driven data base that helps diagnose software problems and then provides possible solutions. This data base is updated so that each question and/or problem becomes part of the data base. Volume purchasers also receive three days of introductory level training at IBM's PC center in Boca Raton, Florida. A third service available to volume purchasers is a toll free telephone support available during normal working hours.

- For non-volume purchasers, IBM provides end-user software support much like that of most other vendors. Users can get support either through an IBM product center or, as is more often the case, through the IBM-authorized dealer from where the user purchased the product. Users can also purchase, for a flat fee, a limited number of telephone support questions, but most often IBM's involvement in micro software support is in the training and support of their dealers.

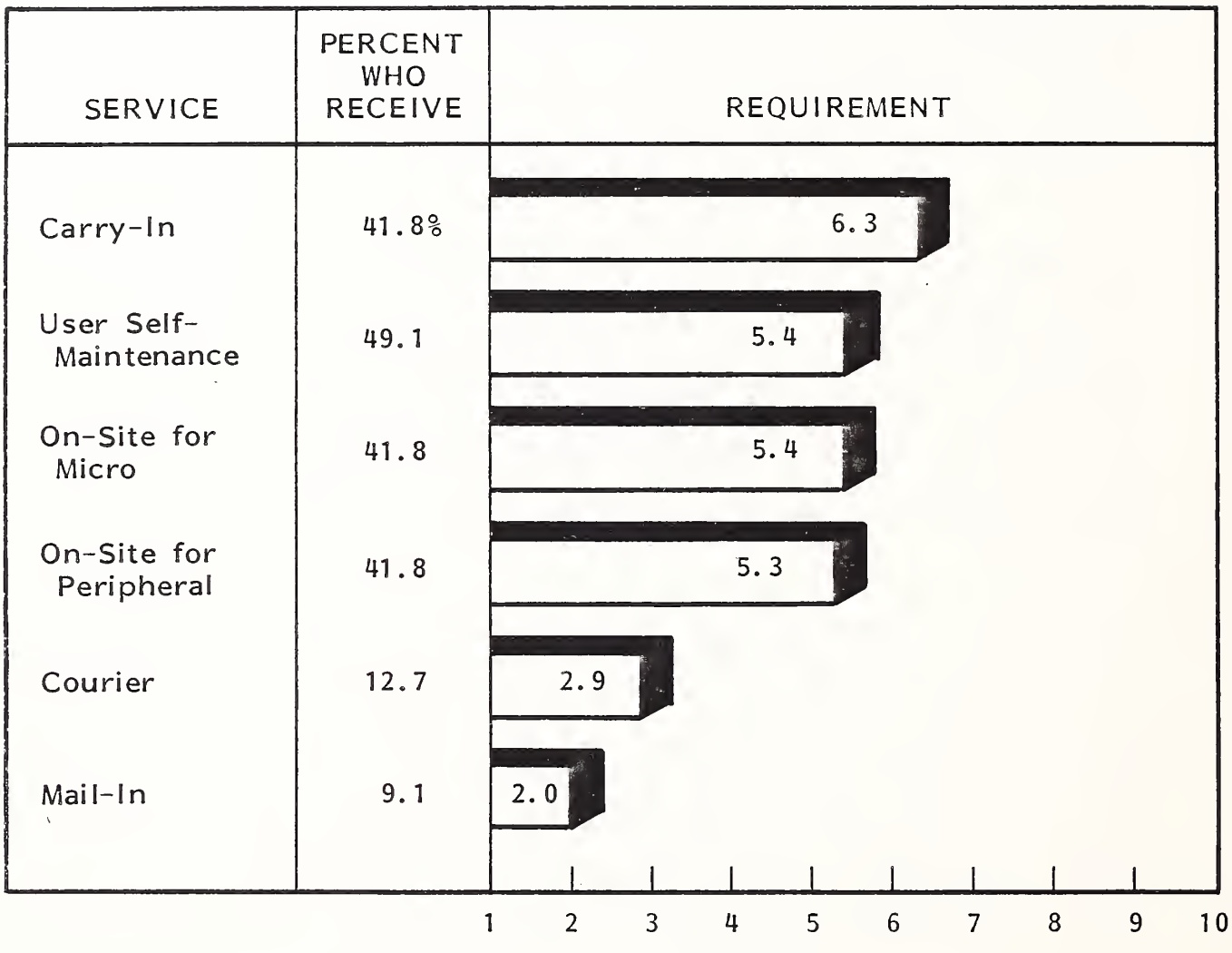
- As stated previously, IBM has steadily increased its own direct participation in the maintenance of its own equipment. Coupled with this increased activity has been an increased availability of on-site maintenance, spurred by the growing requirement for more responsive support and service. Exhibit IX-6 shows that almost 42% of all IBM micro users surveyed receive some form of on-site maintenance. This percentage will undoubtedly grow in the near future until microcomputer maintenance for IBM equipment will be performed predominantly on-site, especially as older PCs are replaced with newer, more sophisticated machines.

- Even though courier still represents only a small share of IBM's micro service business, IBM users report the most experience with courier service of any

EXHIBIT IX-6

CURRENT MAINTENANCE DELIVERY METHOD

VENDOR: IBM



microcomputer vendor group. Courier service was originally introduced as a service that would simulate the convenience of on-site maintenance by freeing a user from the inconvenience of packing up and transporting their micro to and from a service location. Most users, however, did not feel that the convenience of having someone pick up and delivery the micro was worth the premium (over the standard depot contract price), since the response and repair times were not noticeably improved. To this day, most micro users have shown little interest in or acceptance of this form of depot maintenance.

- Also shown in Exhibit IX-6 is the considerable experience that IBM micro users have in maintaining their own equipment. Original PC owners often had to install expansion boards, not only to provide monitor and printer ports but also to expand the PC's internal memory in order to run most of the more current applications software. In additon, many PC owners had to familiarize themselves in the configuring of their machines through DIP switch settings on the PC's mother board. In doing so, many PC owners became familiar with and comfortable with providing rudimentary self-maintenance and support.

- In addition, IBM provides access to two useful self-maintenance tools. Almost all IBM PC products come with self-diagnostics software which checks the microcomputers configuration and operationality down to the chip level. Also, IBM makes available to users complete hardware documentation that includes diagnostics routines and self-maintenance instruction.

- Since IBM micro users surveyed indicated a slight dissatisfaction with maintenance pricing, it is not surprising that a number of users are involved at some level in self-maintenance. Exhibit IX-7 indicates that users would be very willing to increase their involvement, with fairly realistic discount inducements attached.

EXHIBIT IX-7

MICROCOMPUTER USER WILLINGNESS TO
INCREASE PARTICIPATION IN MAINTENANCE

VENDOR: IBM

SERVICE	WILLING TO INCREASE PARTICIPATION (Percent)	PERCENT DISCOUNT EXPECTED FOR PARTICIPATION
User Self-Maintenance	53.2%	40.3%
Carry-In	43.6	30.3
Mail-In	20.0	30.5

X MICROCOMPUTER SERVICE ANALYSIS--TANDY

X MICROCOMPUTER SERVICE ANALYSIS—TANDY

A. PURCHASE CRITERIA

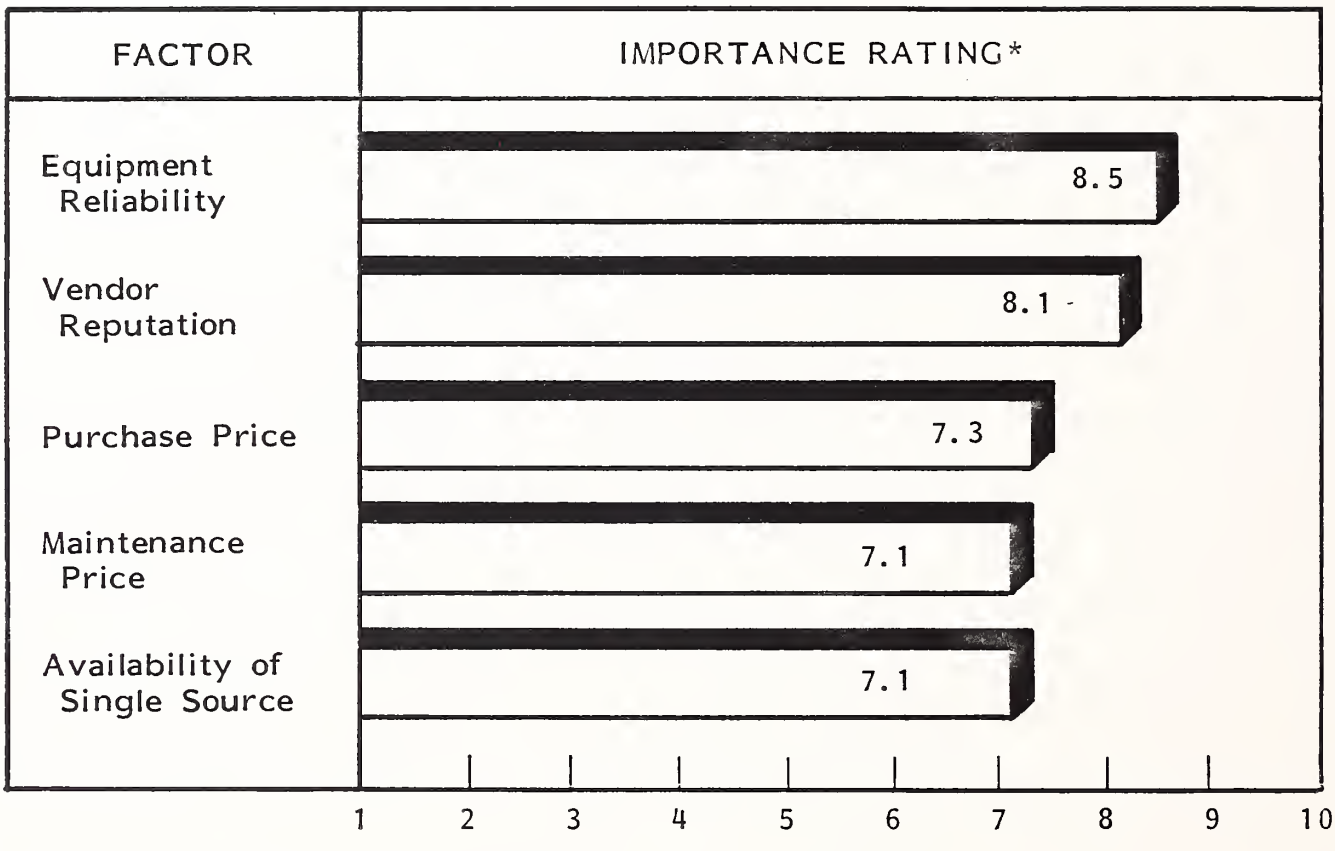
- Prior to IBM's entrance into the microcomputer market, Tandy, through its Radio Shack computer line, and Apple were the two market leaders. In 1979, Tandy held a 21% market share of the microcomputer market, selling $140 million in microcomputer and related products. After IBM's entrance, which sparked a number of PC-compatible companies and later entrances from other large computer manufacturers, Tandy saw its market share dwindle down to 15% in 1984. Still, Tandy continues to receive the majority of its revenues from microcomputers, and with its extensive distribution capabilities and its emphasis on end-user support, the company will continue to be a force in the industry.

- Special mention must be made concerning Tandy's unique position in the market as a result of its distribution network. With more than 400 Radio Shack Computer Centers and full-time Radio Shack retail outlets, Tandy is able to distribute products and, in most outlets, provide service to a very dispersed product base. Thus, in Exhibit III-1 we see that Tandy controls the service dollars of over 94% of all of their business microcomputer users. This is reflected in the importance that Tandy users place upon the availability of single-source maintenance, as shown in Exhibit X-1.

EXHIBIT X-1

IMPORTANCE OF MAINTENANCE FACTORS
IN PURCHASE DECISION

VENDOR: TANDY



* 1 = Low Importance, 10 = High Importance

- Vendor reputation was another key factor in the selection of Tandy computer products. In this area, Tandy has made a great deal of effort to improve the corporate buyers' image of its products, including the replacement of the "Radio Shack" name of its computers with the parent company name "Tandy." In addition, Tandy spends an estimated $200 million advertising its product line, including catalog, newspaper, radio, and television advertisements.

- The attempt to "spruce up" the image of Tandy's computers was a necessary step. In the past, Tandy's growth in corporate offices was hindered by the perception that the Radio Shack computer was for hobbyists, and was not as well designed or built as other microcomputers. The switch to the Tandy logo along with the clear delineation of separate computer stores apart from Radio Shack retail outlets are two examples of Tandy's desire to improve corporate sales.

- In addition, Tandy was hampered by its resistance to providing PC-compatibility in its computers. Until 1984's introduction of the IBM-compatible Model 2000, Tandy's computers relied on their own proprietary operating system, TRSDOS, and later incorporated CP/M into their software library. With the Model 2000 and the recently-introduced Model 1000, Tandy hopes to attract more Fortune 1000 customers.

- Price-sensitivity toward maintenance was another key factor in the decision to purchase a Tandy computer. Tandy, perhaps as a concession to the home hobbyist, offers the best deal at $30 per half hour, with only a half hour minimum charge, in time-and materials maintenance pricing. Since an on-site contract carrys a $400 per year price tag, it is no surprise that the vast majority of Tandy micro users, including over 80% of our sample, opt for T&M maintenance over contracts.

B. USER SATISFACTION WITH SERVICE—TANDY

- Exhibits X-2 and X-3 show Tandy users reported disappointment with the quality of hardware maintenance and software support that they received from their vendor. Particularly surprising was the the low rating Tandy received in the area of vendor-customer communication, considering the captured market Tandy has in the distribution and support of its products.

- System availabilty, or the lack of it, seems to be the main problem reported by Tandy users. Exhibit X-4 shows that even though Tandy users have a very low requirement of just over 75% system availability, Tandy failed to even meet that. Chief culprit is the extremely slow repair time of almost three working days reported by the users. This repair time results from the low priority given to T&M customers, which most Tandy users are, compounded by the structure of the service delivery organization, which requires that almost all repairs be transported from the computer center location where the computer is dropped off to a regional repair center where the repairs are actually performed.

- Responsiveness is even a problem with contract customers. Tandy will make a "best effort" at next day on-site response, since most of the on-site service engineers are located at these regional repair locations.

- Software support is traditional a weakness in microcomputer support; however, Exhibit X-5 indicates that Tandy has made some effort to provide responsive support to their micro users, Tandy found that a toll-free support number offering was overused (often with operational questions), thus forcing users to wait excessive lengths of time for an available support technician. Instead, Tandy now releases regionalized telephone support numbers, in addition to encouraging users to contact local computer center locations for help.

EXHIBIT X-2

MICROCOMPUTER USER SATISFACTION WITH SERVICE

VENDOR: TANDY

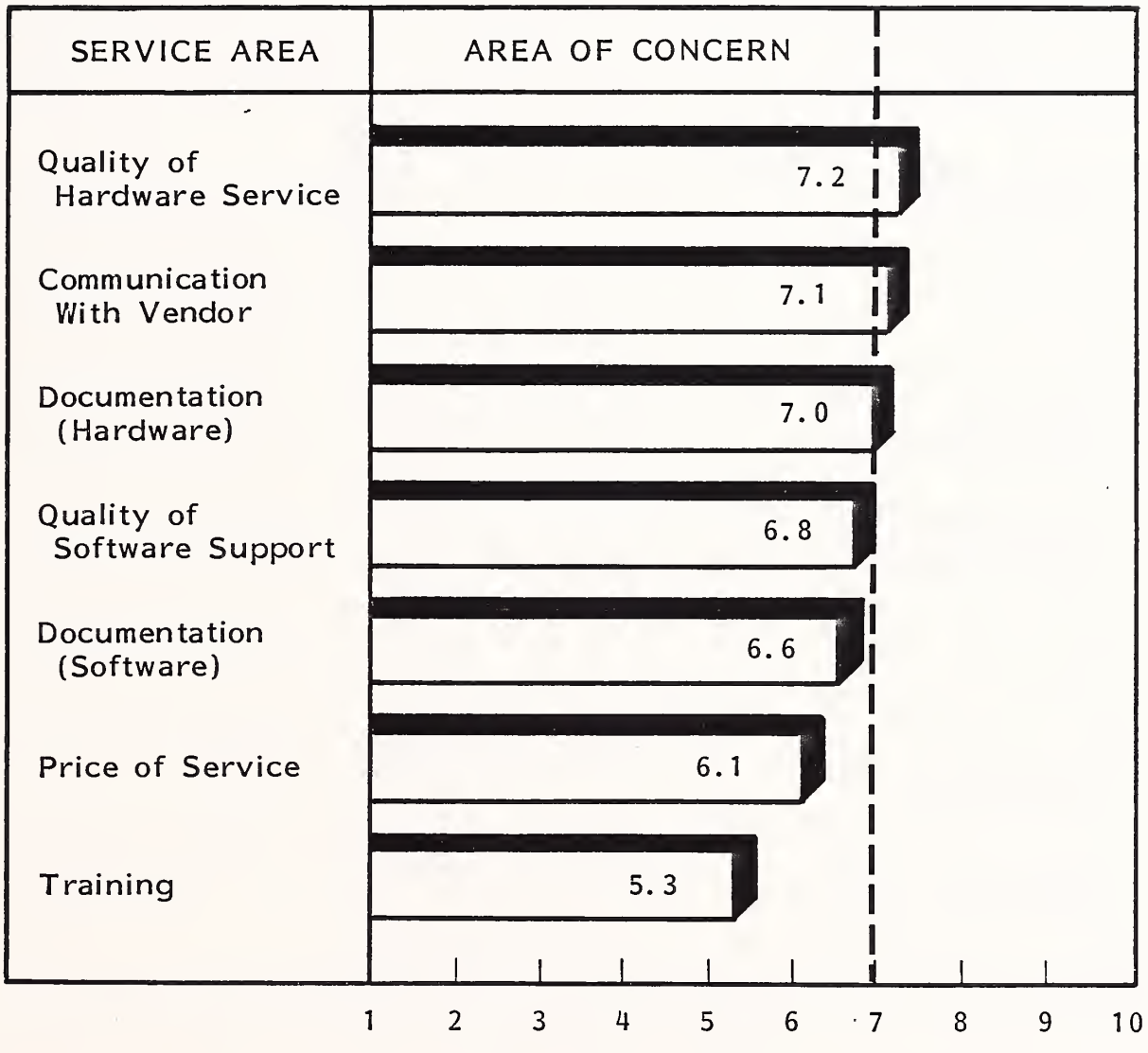


EXHIBIT X-3

MICROCOMPUTER VENDOR PERFORMANCE
VERSUS INDUSTRY AVERAGE

VENDOR: TANDY

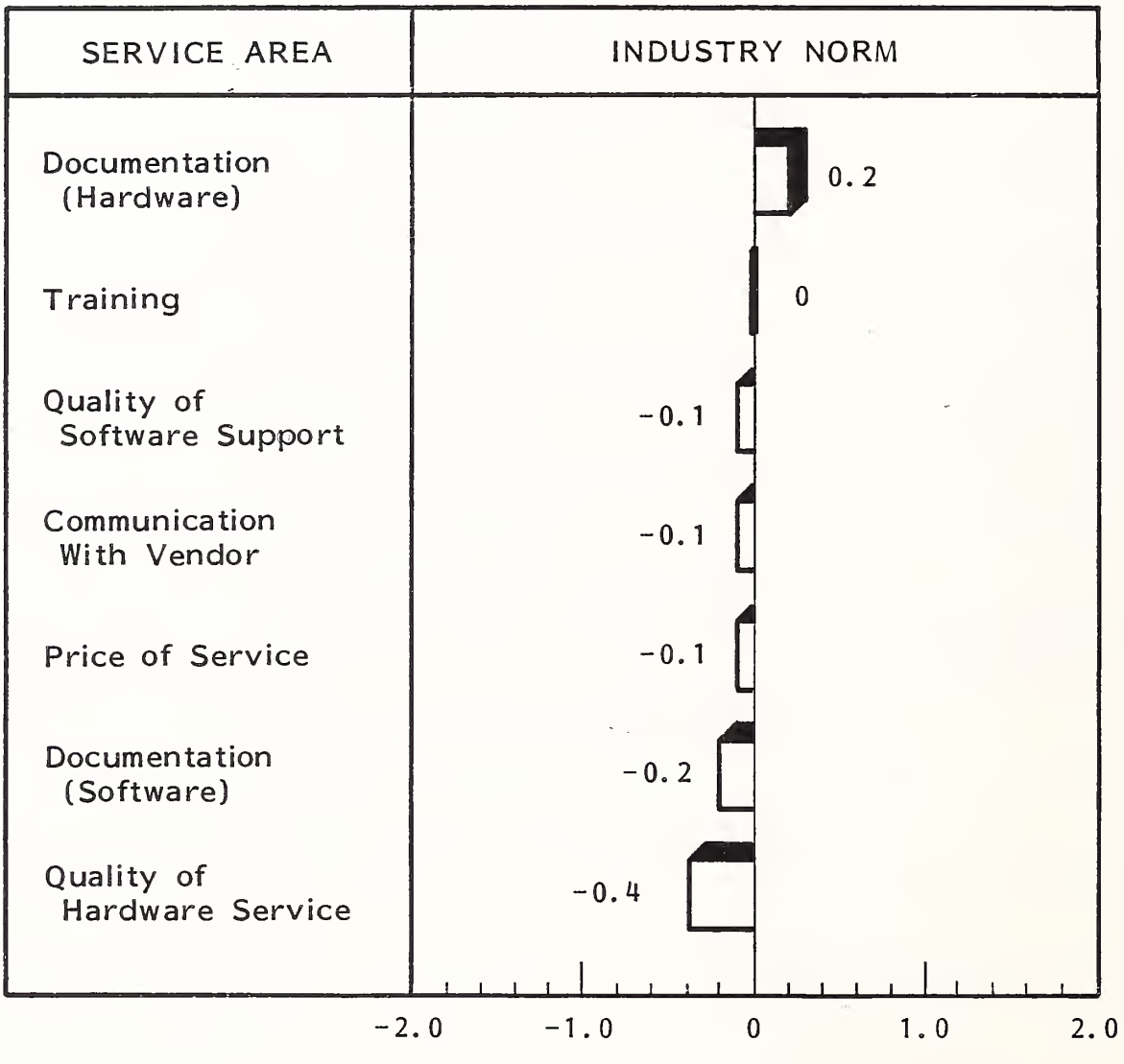


EXHIBIT X-4

1985 HARDWARE MAINTENANCE PERFORMANCE DATA

VENDOR: TANDY

PERFORMANCE AREA	USER RESPONSE
User Rating of Hardware Service (Scale 1-10)	7.2
Hours Microcomputer Used Per Day	4.5
System Availability Required (Percent)	75.6%
System Availability Received (Percent)	70.4%
Hardware Failures Per Year	4.3
Hardware Response Time Received (Hours)	6.3
Hardware Repair Time Received (Hours)	22.8

EXHIBIT X-5

1985 SOFTWARE SUPPORT PERFORMANCE DATA

VENDOR: TANDY

PERFORMANCE AREA	USER RESPONSE
User Rating of Software Support (Scale 1-10)	6.8
Software Failures per Year	4.1
Software Response Time Received (Hours)	3.2
Software Repair Time Received (Hours)	12.6

- Another weakness, indicated by the number of support calls that were operational in nature, that Tandy has made efforts to improve is in software documentation. All third-party software is now reviewed, edited, and approved by the Tandy service organization before release.

- Exhibit X-6 shows the different delivery methods that Tandy users have had experience with in receiving maintenance for their micros. Note that half of the sample had received their maintenance on-site while over three-quarters were experienced with carry-in maintenance. In practice, Tandy offers on-site maintenance on a TRS-80 Model III for $400/year while charging only $200/year for carry-in. Yet Exhibit X-7 shows that Tandy users feel that a 21% discount of carry-in maintenance would be sufficient. It is not difficult to see why most Tandy users opt for carry-in service for their micro maintenance.

EXHIBIT X-6

CURRENT MAINTENANCE DELIVERY METHOD

VENDOR: TANDY

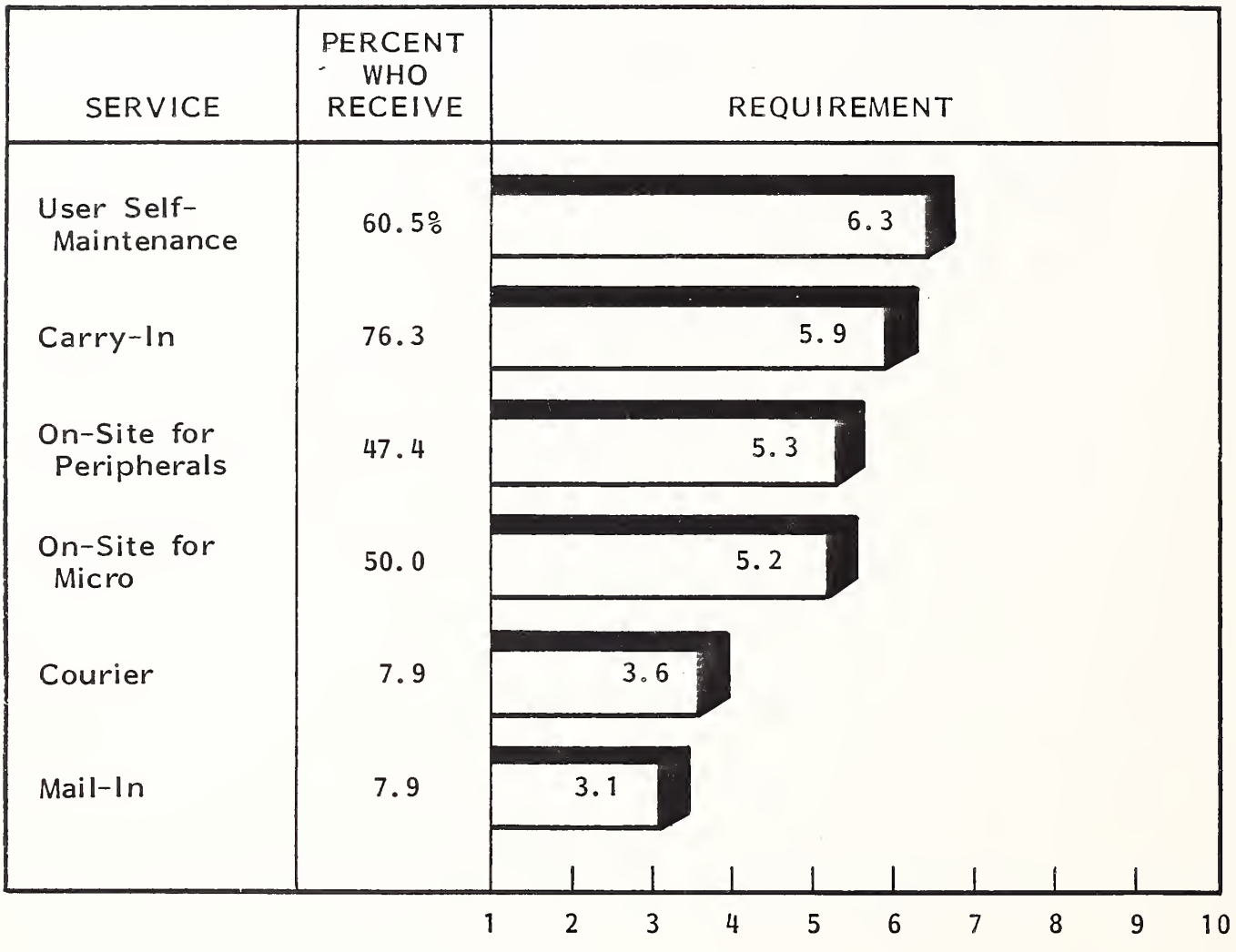


EXHIBIT X-7

MICROCOMPUTER USER WILLINGNESS TO INCREASE PARTICIPATION IN MAINTENANCE

VENDOR: TANDY

SERVICE	WILLING TO INCREASE PARTICIPATION (Percent)	PERCENT DISCOUNT EXPECTED FOR PARTICIPATION
User Self-Maintenance	65.3%	51.9%
Carry-In	50.0	21.4
Mail-In	23.7	28.9

XI MICROCOMPUTER SERVICE ANALYSIS--OTHER

XI MICROCOMPUTER SERVICE ANALYSIS—OTHER

A. PURCHASE CRITERIA

- Since the first phase of the surveying process involved mail surveys from Fortune 1000 corporations, responses were received from users of a wide range of microcomputer products. Some of these responses were discarded, due to their vendors' insignificance in the business microcomputer market.

- Three small groups of responses, from users with a Datapoint, Wang, or Sperry microcomputer, were combined and included in this chapter because they met three qualifications:

  - All three are traditional small-systems vendors who have entered the microcomputer market partly out of necessity to curb the flow of IBM PC's into the Information Systems (IS) strategy of their small-systems customers.

  - In doing so, all three vendors have developed a networked, micro-host product strategy which will require new service offerings.

  - And since these vendors are traditional small-systems vendors, rather than microcomputer manufacturers, all three should have the service organization that will be able to provide the quality and quantity of support necessary for a micro-host support offering.

- As a result, their users look to these vendors with higher service requirements than most users. Usually these users are trying to develop an office automation strategy, integrating these microcomputers with existing data processing or word processing systems. Since these users have higher service requirements for their existing equipment, it is understandable that they would also have higher expectations than most microcomputer users.

- Exhibit XI-1 demonstrates that these users have extremely high system availability requirements, since they rate equipment reliability at 9.7 (out of a possible 10) in importance as a decision criteria. Again, this reflects the users experience with or recognition of system availability required, both for these vendors' larger systems and for the networked systems for which these micro products are going to be used.

- The exhibit confirms the importance of name recognition in the selection of these microcomputers. In most cases, a prospective micro user already has experience with the vendor, either with their small systems or their word processing equipment.

- Note that maintenance price is a fairly unimportant factor in the purchase decision. Since these users want to roll these micros into their existing IS system, these users are familiar with the costs attached to larger system maintenance. They also have a greater perception of the need for and value of effective service and support.

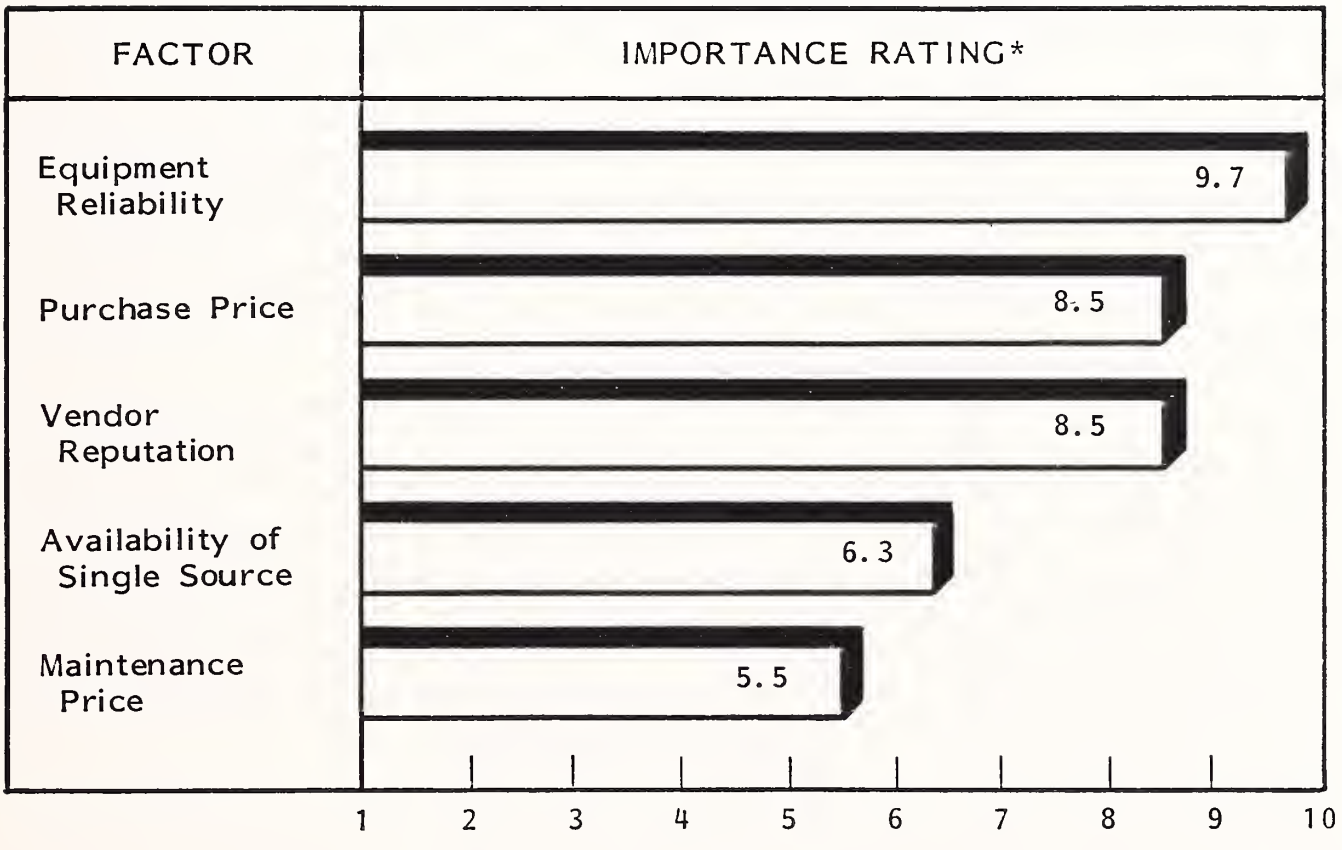
B. USER SATISFACTION WITH SERVICE—OTHER

- Since this chapter is a grouping of responses by users of three different vendors, the responses will be summarized to show the increased service requirements that will result from the networking of microcomputers into the

EXHIBIT XI-1

IMPORTANCE OF MAINTENANCE FACTORS
IN PURCHASE DECISION

VENDOR: OTHER



* 1 = Low Importance, 10 = High Importance

larger IS strategy of a company, and how this increased service requirement will result in user dissatisfaction until microcomputer vendors increase their service levels to that of a small-system service offering.

- Exhibits XI-2 and XI-3 indicate the current dissatisfaction that these users feel with their present service offerings. In fact, the only strong point of these users responses is the satisfaction with the pricing of their service coverage. As previously shown, these users expect to pay for quality service; it might be conceiveable that users would be willing to pay premiums to improve their service in many support areas, particulary end-user training, which received a very low rating from these users.

- Hardware documentation is another case where users expressed particular concern. These users are either already networking their micros or expect to be doing so in the near future, and their requirements for hardware documentation are much greater. Considering the dissatisfaction these users also report for the training that they received, the implementation of a networked system must be extremely difficult.

- Exhibit XI-4 highlights the increased service requirements of the users surveyed. These micros are used a great deal of the time, which is understandable if used in terminal emulation or in some form of micro-host application. Also, system availability requirements are quite high, with users requiring uptime of almost 96%, a level approaching small systems user requirements.

- The exhibit indicates that hardware maintenance performance is actually quite good, with system availability exceeding the already high requirements of the users. Key to this performance is extremely fast response and repair times, which approach the responsiveness of small systems maintenance vendors.

EXHIBIT XI-2

MICROCOMPUTER USER SATISFACTION WITH SERVICE

VENDOR: OTHER

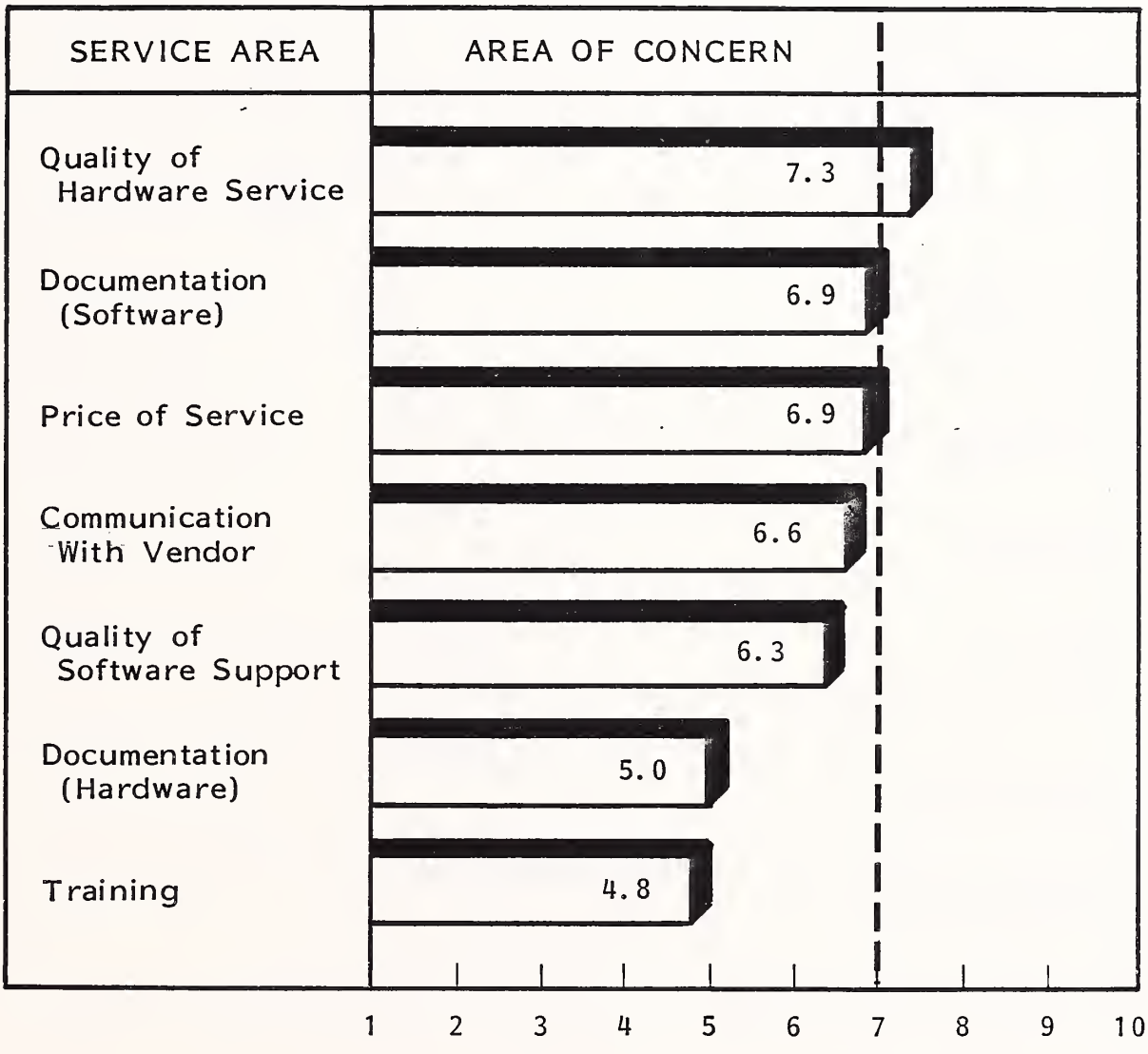


EXHIBIT XI-3

MICROCOMPUTER VENDOR PERFORMANCE
VERSUS INDUSTRY AVERAGE

VENDOR: OTHER

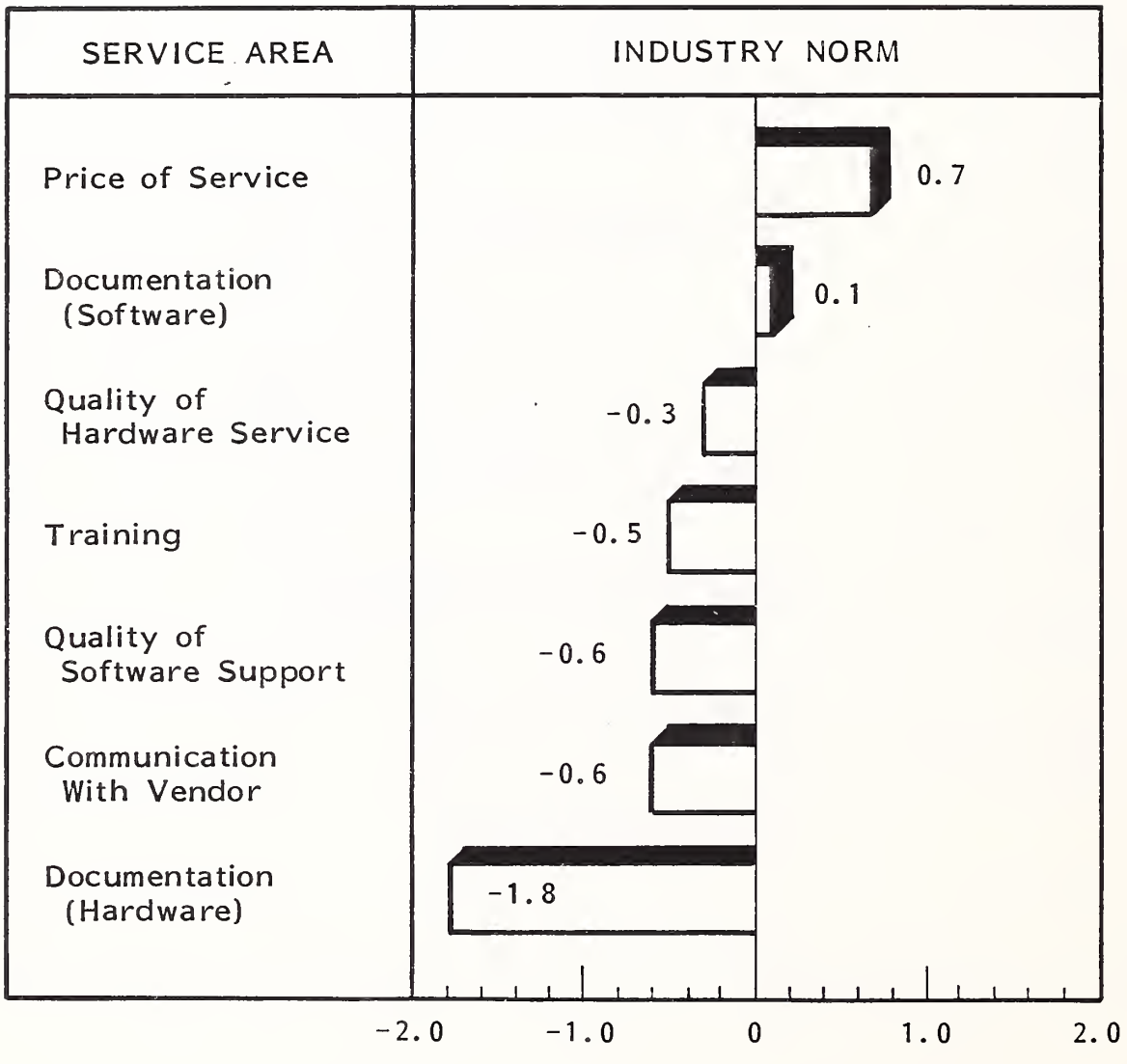


EXHIBIT XI-4

1985 HARDWARE MAINTENANCE PERFORMANCE DATA

VENDOR: OTHER

PERFORMANCE AREA	USER RESPONSE
User Rating of Hardware Service (Scale 1-10)	7.3
Hours Microcomputer Used Per Day	5.6
System Availability Required (Percent)	95.9%
System Availability Received (Percent)	97.3%
Hardware Failures Per Year	3.2
Hardware Response Time Received (Hours)	3.3
Hardware Repair Time Received (Hours)	4.9

- According to Exhibit XI-5, software support performance drops off slightly, with vendor responsiveness an area of concern. Software support is an area of importance to network-micro users, and will require even more attention if these vendors hope to increase their market penetration through network sales.

- An important contribution to the lack of user service satisfaction is the unavailability of on-site network support. In many cases, the user becomes the sole source of network support, as shown in Chapter III. Exhibit XI-6 also indicates that users become their own service vendors, which 45% of all users participating in their own maintenance. In order to improve user satisfaction with service, which will then encourage further use of micro networking, vendors will need to develop and encourage the use of on-site micro maintenance and support. If not, more users will become involved in self-maintenance. Exhibit XI-7 indicates that over half of the users would be willing to increase their participation in self-maintenance, resulting in lost service revenue potential and increased user dissatisfaction.

EXHIBIT XI-5

1985 SOFTWARE SUPPORT PERFORMANCE DATA

VENDOR: OTHER

PERFORMANCE AREA	USER RESPONSE
User Rating of Software Support (Scale 1-10)	6.3
Software Failures Per Year	1.4
Software Response Time Received (Hours)	10.4
Software Repair Time Received (Hours)	12.2

EXHIBIT XI-6

CURRENT MAINTENANCE DELIVERY METHOD

VENDOR: OTHER

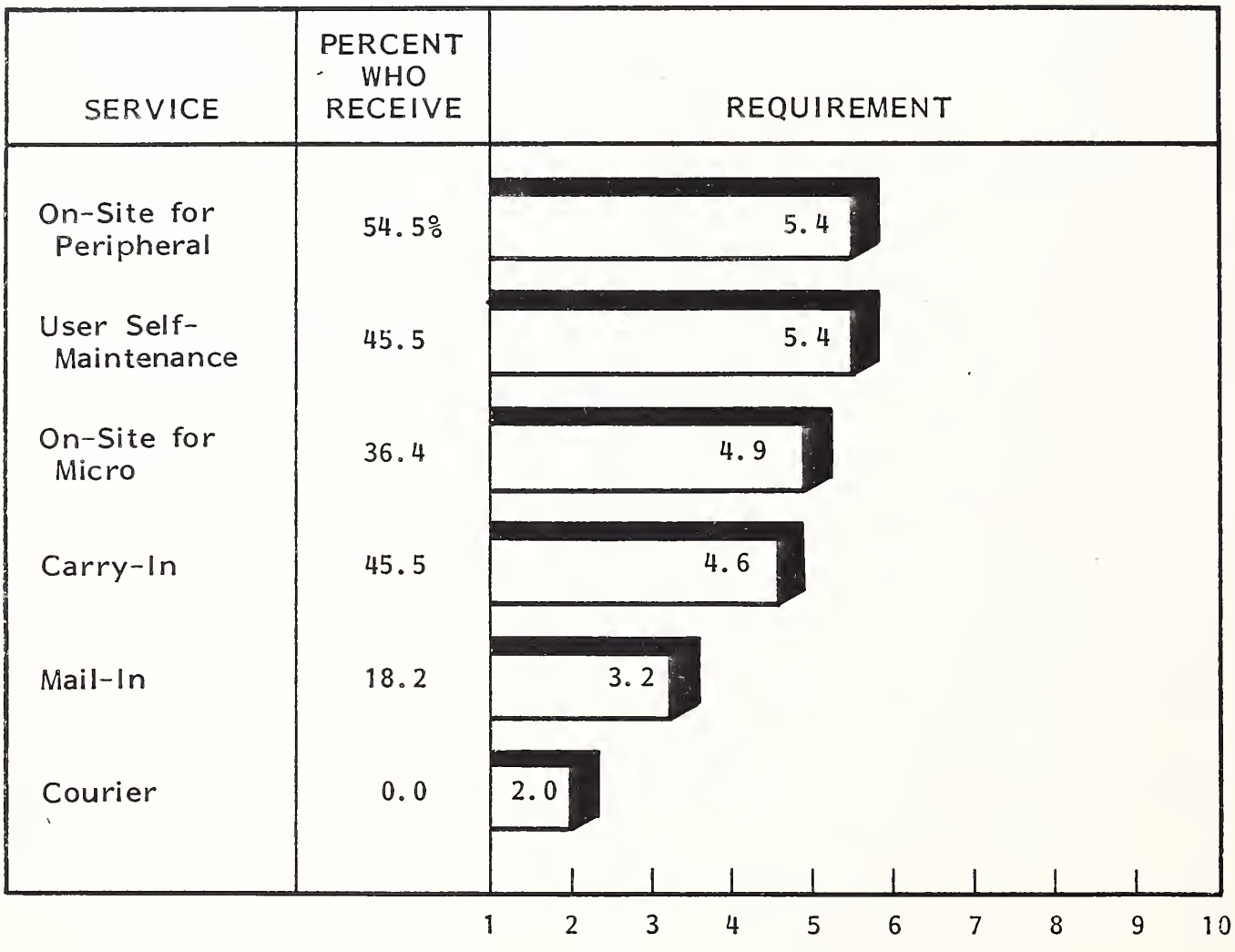


EXHIBIT XI-7

MICROCOMPUTER USER WILLINGNESS TO
INCREASE PARTICIPATION IN MAINTENANCE

VENDOR: OTHER

SERVICE	WILLING TO INCREASE PARTICIPATION (Percent)	PERCENT DISCOUNT EXPECTED FOR PARTICIPATION
User Self-Maintenance	54.5%	34.0%
Carry-In	45.5	30.0
Mail-In	27.3	30.0

APPENDIX A: QUESTIONNAIRE

Company: _____

Respondent Name: _____ Title: _____

Product: _____ Model: _____

Vendor who supplies maintenance: _____

Is your maintenance (check one) ☐ contract ☐ or hourly?

1. When making your personal computer purchase decision, how important are the following factors? (1 = not important, 10 = very important.)

   A. _____ Purchase price of equipment
   B. _____ Price of maintenance
   C. _____ Equipment reliability
   D. _____ Vendor reputation
   E. _____ Availability of a single source of service

2. Please rate (on a scale of 1 = low, 10 = high) your overall satisfaction with the following:

   A. _____ Quality of hardware service
   B. _____ Quality of software support
   C. _____ Communication with your service vendor
   D. _____ Documentation (hardware)
   E. _____ Documentation (software)
   F. _____ Training
   G. _____ Price of service

3. A. How many hours a day, on average, do you use your personal computer? _____
   B. What overall level of system availability (uptime) do you require? _____%
   C. What level do you receive? _____%

4. A. What is the average time that it takes your service vendor to respond to a hardware problem? (in hours) _____
   B. A software problem? (in hours) _____

5. A. What is the average time that it takes your service vendor to repair a hardware problem? (in hours) _____
   B. A software problem? (in hours) _____

6. A. How many hardware failures do you experience on average per year? _____
   B. How many software failures do you experience on average per year? _____

7. Is your personal computer currently networked with other computers and/or office products? ☐ Yes ☐ No
If yes, please list the type of network, the products attached, and the source of service below. If no, do you plan to network your personal computer in the next two years? ☐ Yes ☐ No

NETWORK	PRODUCTS ATTACHED	SOURCE OF SERVICE

8. Please rate on a scale of 1-10 your requirement for the following: (1 = low requirement, 10 = high requirement)

SERVICE	REQUIREMENT (1 = Low, 10 = High)	DO YOU RECEIVE CURRENTLY? (Yes/No)
a. On-site PC Hardware Maintenance		
b. On-site Peripheral Maintenance		
c. Depot Maintenance		
1. Carry-in		
2. Mail-in		
3. Courier		
d. User Self-Maintenance		

9. Are you willing to increase your involvement in maintaining your equipment by the following methods?

SERVICE	WILLING TO DO (Yes/No)	WHAT PERCENT DISCOUNT WOULD YOU EXPECT FOR YOUR PARTICIPATION?
Carry-in		
Mail-in		
User self-maintenance (Please specify what level of maintenance you would be willing to perform, e.g. board swap). _____ _____		

10. A. As an experienced personal computer user, what is your main service concern? _____

_____

_____

B. What single change would you like your service vendor to make to improve his service to you? _____

_____

_____

THANK YOU FOR YOUR PARTICIPATION AND YOUR ASSISTANCE!

APPENDIX B: DATA BASE FORMAT

APPENDIX B

DATA BASE FORMAT

FIELD	FIELD NAME	TYPE	WIDTH	DEC
1	CATNO	Numeric	3	
2	COMPANY	Character	30	
3	STREET	Character	30	
4	CITY	Character	30	
5	STATE	Character	2	
6	ZIP	Character	5	
7	CONTACT	Character	30	
8	TITLE	Character	20	
9	PRODUCT	Character	20	
10	MODEL	Character	15	
11	VENDOR	Character	1	
12	CONTRACT	Character	1	
13	HOURLY	Character	1	
14	Q1A	Numeric	2	
15	Q1B	Numeric	2	
16	Q1C	Numeric	2	
17	Q1D	Numeric	2	
18	Q1E	Numeric	2	
19	Q2A	Numeric	2	
20	Q2B	Numeric	2	
21	Q2C	Numeric	2	
22	Q2D	Numeric	2	
23	Q2E	Numeric	2	
24	Q2F	Numeric	2	
25	Q2G	Numeric	2	
26	Q3A	Numeric	4	1
27	Q3B	Numeric	5	1
28	Q3C	Numeric	5	1
29	A4A	Numeric	5	1
30	Q4B	Numeric	5	1
31	Q5A	Numeric	5	1
32	Q5B	Numeric	5	1
33	Q6A	Numeric	5	1
34	Q6B	Numeric	5	1
35	Q7A	Character	1	
36	Q7B	Character	1	
37	Q7A1	Character	25	
38	Q7B1	Character	25	
39	Q7C1	Character	25	
40	Q7A2	Character	25	
41	Q7B2	Character	25	
42	Q7C2	Character	25	
43	Q7A3	Character	25	
44	Q7B3	Character	25	
45	Q7C3	Character	25	
46	Q8A1	Numeric	2	
47	Q8A2	Character	25	
48	Q8B1	Numeric	2	
49	Q8B2	Character	1	
50	Q8C1A	Numeric	2	
51	Q8C1B	Character	1	
52	Q8C2A	Numeric	2	
53	Q8C2B	Character	1	
54	Q8C3A	Numeric	2	
55	C8C3B	Character	1	
56	Q8D1	Numeric	2	
57	Q8D2	Character	1	
58	Q9A1	Character	1	
59	Q9B1	Numeric	5	1
60	Q9A2	Character	1	
61	Q9B2	Numeric	5	1
62	Q9X	Character	20	
63	Q9A3	Character	1	
64	Q9B3	Numeric	5	1
65	Q10A	Character	79	
66	Q10B	Character	79	
	Total		727	

APPENDIX C: DEFINITIONS

APPENDIX C: DEFINITIONS

- APPLICATION SOFTWARE - Software that performs processing to service end-user functions.

- CONSULTING - Includes analysis of user requirements and development of a specific action plan to meet user service and support needs.

- DISPATCHING - The process of allocating service resources to solve a support-related problem.

- DOCUMENTATION - All manuals, newsletters, and texts designed to serve as reference material for the ongoing operation or repair of hardware or software.

- END USER - May buy a system from the hardware supplier(s) and do his own programming, interfacing and installation. Alternatively, he may buy a turnkey system from a systems house or hardware integrator.

- ENGINEERING CHANGE NOTICE (ECN) - Product changes to improve the product after it has been released to production.

- ENGINEERING CHANGE ORDER (ECO) - The follow-up to ECNs which include parts and a bill of material to effect the change in hardware.

- ESCALATION - The process of increasing the level of support when and if the field engineer cannot correct a hardware or software problem within a prescribed amount of time, usually two to four hours for hardware.

- FIELD ENGINEER (FE) - For the purpose of this study, field engineer, customer engineer, serviceperson, and maintenance person were used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

- HARDWARE INTEGRATOR - Develops system interface electronics and controllers for the CPU, sensors, peripherals and all other ancillary hardware components. He may also develop control system software in addition to installing the entire system at the end user site.

- LARGE SYSTEM - Refers to traditional mainframes including, at the low end, IBM 4300-like machines and, at the high end, IBM 308X-like machines. Large systems have a maximum word length of 32 bits and a standard configuration price of $350,000 and higher.

- MEAN TIME BETWEEN FAILURES (MTBF) - The elapsed time between hardware failures on a device or a system.

- MEAN TIME TO REPAIR - The elapsed time from the arrival of the field engineer on the user's site until the device is repaired and returned to the user for his utilization.

- MEAN TIME TO RESPOND - The elapsed time between the user placement of a service call and the arrival at the user's location of a field engineer.

- MINICOMPUTER - See Small System.

- OPERATING SYSTEM SOFTWARE (SYSTEMS SOFTWARE) - Software that enables the computer system to perform basic functions. System software,

for the purposes of this report, does not include utilities or program development tools.

- PERIPHERALS - Includes all input, output, and storage devices, other than main memory, which are locally connected to the main processor and are not generally included in other categories, such as terminals.

- PLANNING - Includes the development of procedures, distribution, organization, and configuration of support services; for example, capacity planning, "installation" planning.

- PLUG-COMPATIBLE MAINFRAME (PCM) - Mainframe computers that are compatible with and can execute programs on an equivalent IBM mainframe. The two major PCM vendors at this time are Amdahl and National Advanced Systems.

- SMALL BUSINESS COMPUTER - For the purpose of this study, a system which is built around a Central Processing Unit (CPU), has the ability to utilize at least 20M bytes of disk capacity, provides multiple CRT workstations, and offers business-oriented system software support.

- SMALL SYSTEM - Refers to traditional minicomputer and superminicomputer systems ranging from a small, multiuser, 16-bit system at the low end to a sophisticated 32-bit machine at the high end.

- SOFTWARE ENGINEER (SE) - The individual who responds (either on-site or via remote support) to a user's service call to repair or patch operating system and/or applications software.

- SOFTWARE PRODUCTS - Systems and applications packages which are sold to computer users by equipment manufacturers, independent vendors, and others. Also included are fees for work performed by the vendor to implement a package at the user's site.

- SUPERMINICOMPUTER - See Small System.

- SYSTEM INTERRUPTION - Any system downtime requiring an Initial Program Load (IPL).

- SYSTEMS HOUSE - Integrates hardware and software into a total turnkey system to satisfy the data processing requirements of the end user. May also develop system software products for license to end users.

- TRAINING - All audio, visual, and computer based documentation, materials, and live instruction designed to educate users and support personnel in the ongoing operation or repair of hardware and software.

- TURNKEY SYSTEM - Composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.