United States General Accounting Office

GAO

Briefing Report to the Chairwoman
Subcommittee on Technology
Committee on Science
House of Representatives

August 1995

MANUFACTURING EXTENSION PROGRAMS

Manufacturers' Views of Services

GAO/GGD-95-216BR

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United States
General Accounting Office
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General Government Division

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August 7, 1995

The Honorable Constance A. Morella
Chairwoman
Subcommittee on Technology
Committee on Science
House of Representatives

Dear Chairwoman Morella:

This briefing report summarizes U.S. manufacturers' opinions regarding the services they received from manufacturing extension programs (MEP) in 1993. We obtained the views of manufacturers served by 57 MEP, which are state/federal partnerships that offer manufacturers assistance in modernizing or upgrading their operations.

As requested, we obtained manufacturers' views regarding the impact of MEP services on their business performance and the factors affecting the impact of MEP services. We did not verify either positive or negative impacts reported by manufacturers, and we did not evaluate the operations or management of specific federal or state programs. We also obtained the views of other manufacturers with little or no MEP experience to determine why they made little or no use of MEP.

We provided a briefing to Subcommittee staff on July 27, 1995. This report summarizes the substance of the briefing. As agreed, in our report that is to follow, we will present an in-depth analysis of manufacturers' views and copies of the questions we asked manufacturers, along with their aggregate responses.

Results in Brief

Most manufacturers responding to our questionnaire—about 73 percent (or 389)—reported that they believed MEP assistance had positively affected their overall business performance. About 15 percent (or 82) of the respondents reported that they believed MEP assistance had not affected their overall business performance. Approximately 8 percent (or 41) said that it was too early to tell the effect, and another 4 percent (or 22) said they had had no basis to estimate the effect. (See briefing section II.)

With regard to the impact of MEP assistance on more specific indicators of manufacturers' business performance, most respondents reported that the assistance had positively affected their use of technology in the workplace

(approx. 63 percent, or 340), the quality of their product (approx. 61 percent, or 325), and the productivity of their workers (approx. 56 percent, or 299). Between about 44 percent and 63 percent of respondents reported that MEP assistance had positively affected certain specific indicators of their business performance, such as their customer satisfaction (300), their profits (277), and their ability to meet production schedules (265). Of those respondents not reporting a positive impact on specific indicators of their business performance, most said MEP assistance had not had any impact. About 2 percent, or fewer, respondents reported a negative impact on each specific performance indicator. One of the manufacturers that reported that MEP assistance had not affected its business performance commented that it had not followed MEP suggestions, and another reported that it had not put enough of its own time into completing MEP assistance. (See briefing section II.)

Among the factors that manufacturers said had affected the impact of MEP services was their own companies' input. Companies that had committed their own financial resources to implement MEP recommendations reported greater benefits from MEP assistance relative to other survey respondents. Of those 322 respondents who had made a financial investment, 86 percent (or 269) said that MEP assistance had positively affected their business performance. However, 54 percent (or 119) of those who had not made a financial investment reported an overall positive impact. Other factors that respondents reported influenced the effectiveness of MEP services were the expertise and experience of MEP staff and the affordability of the assistance. (See briefing section II.)

In our related telephone survey of 200 additional manufacturers who were not extensive users of MEP services, 163 (about 82 percent) reported that they had not used MEP services because they were unaware of these programs. Twenty-one (about 10 percent) said that although they knew about MEP, they had not used MEP because they believed the assistance would not be necessary. Companies we interviewed said that other sources of modernization assistance besides MEP were their customers, vendors and/or suppliers, industry associations, and consultants. (See briefing section III.)

Background

In 1993, the National Research Council reported[1] that small- and medium-sized manufacturers[2] represented the bulk (more than 98 percent) of U.S. manufacturing establishments, were integral parts of the supply chain for commercial and defense products, and provided approximately 40 percent of manufacturing employment. However, the Council said that these manufacturers generally lacked the expertise, time, money, and information necessary to upgrade in order to maintain their ability to compete successfully in the modern marketplace.

Because of the important role these firms play in providing jobs, over the last decade states began funding various technology assistance initiatives. During fiscal years 1992 through 1994, states spent a total of $1.01 billion[3] on these initiatives, including MEP. In addition to state governments, the federal government provides funding for grants and other activities related to MEP, through the Manufacturing Extension Partnership Program managed by the National Institute of Standards and Technology (NIST).[4] In fiscal year 1994, the federal government appropriated $66 million to MEP and related activities, and the states collectively spent an estimated $57.7 million.[5] Other sources of MEP support may come from universities, private industry, and users' fees.

Scope and Methodology

To obtain the views of MEP users, we surveyed 766 U.S. manufacturers that had completed at least 40 hours of MEP assistance in one or more of four service categories[6] in 1993. A total of 551 manufacturers (72 percent) completed and returned the questionnaire. We had obtained the names of these manufacturers from the directors of 57 MEP in 34 states.

[1]Learning to Change: Opportunities to Improve the Performance of Smaller Manufacturers, National Research Council (Washington, D.C.: National Academy Press, 1993).

[2]The Small Business Administration (SBA) generally defines a small business as having fewer than 500 employees. Some experts have further divided small manufacturers into small firms with fewer than 100 employees and medium-sized firms with from 100 to 499 employees. This report collectively refers to firms with fewer than 500 employees as small- and medium-sized manufacturers.

[3]This figure includes programs that are administered or directly sponsored by state governments that involve a government/industry or a government/industry/university partnership, and that have as a primary goal the use of technology to enhance economic growth. See Partnerships: A Compendium of State and Federal Cooperative Technology Programs, ed. C.M. Coburn (Columbus, OH: Battelle Memorial Institute, 1995), p. 43.

[4]The Manufacturing Extension Partnership Program is known as MEP. However, this report collectively refers to all state, federal, and university manufacturing extension programs as MEP.

[5]Partnerships, p. 55.

[6]The four service categories were (1) Quality Improvement, (2) Equipment Modernization and Plant Layout, (3) Product Design and Development, and (4) Environmental or Energy.

To determine why other manufacturers had made little or no use of MEP, we conducted telephone interviews with a total of 200 manufacturers located in four Standard Metropolitan Statistical Areas (SMSA) where MEP are located. These SMSAs were Albany/Troy/Schenectady, NY; Atlanta, GA; Kansas City, MO; and Los Angeles, CA. Using a commercial database, we selected manufacturers with little or no MEP experience in each SMSA that were in the same industries and employed similar numbers of people as did the majority of our questionnaire respondents. (For more details about the methodology we used to meet our reporting objectives, see app. I.)

We did our work between March 1994 and July 1995 in accordance with generally accepted government auditing standards.

Since we did not evaluate the operations or management of specific federal programs, we did not obtain agency comments on this report. However, on July 24, 1995, we discussed the facts presented in this report with the Director of the NIST Manufacturing Extension Partnership Program. He agreed with the technical accuracy of the report and offered minor clarifications, which we incorporated into the report.

As agreed with your office, unless you announce the contents of this briefing report earlier, we plan no further distribution of this report until 14 days after the date of this letter. At that time, we will send copies of this briefing report to the Director of NIST, the Secretary of Commerce, and the Members of Congress and congressional committees that have responsibilities related to these issues. Copies also will be made available to others upon request.

The major contributors to this report are listed in appendix II. Please contact me at (202) 512-4812 if you have any questions concerning this report.

Sincerely yours,

Allan I. Mendelowitz, Managing Director
International Trade, Finance, and
Competitiveness

Contents

Abbreviations

MEP	Manufacturing Extension Programs
NIST	National Institute for Standards and Technology
SBA	Small Business Administration
SIC	Standard Industrial Classification
SMSA	Standard Metropolitan Statistical Area
TRP	Technology Reinvestment Project

Background

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Briefing Objectives

Present manufacturers' views on the:

- impact of MEP services on their business performance
- factors affecting the impact of MEP services

Determine why other manufacturers made little or no use of MEP

Briefing Objectives

Our objectives were to present the views of manufacturers that had used manufacturing extension programs (MEP)[1] services about the impact of MEP services on their business performance and the factors affecting the impact of MEP services. We did not verify either positive or negative impacts reported by manufacturers.

In addition, since an estimated 93 percent[2] of all U.S. small- and medium-sized manufacturers have not yet been served by MEP funded by the National Institute of Standards and Technology (NIST), we asked companies with little or no MEP experience why they had made limited or no use of MEP services. We also asked these companies what resources other than MEP they had used for technical assistance.

[1]The NIST Manufacturing Extension Partnership Program is known as MEP. However, this report collectively refers to all state, federal, and university manufacturing extension programs as MEP.

[2]Estimate based on data contained in NIST documents.

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Manufacturing Extension Programs: Background Information

Programs

- provide technical assistance to small- and medium-sized manufacturers
- offer a range of services, including: consulting, training, planning, marketing, and quality improvement
- serve both individual and groups of companies

MEP Provide Technical Resources for Manufacturers

The primary mission of MEP is to give "hands-on" technical assistance to small- and medium-sized manufacturers trying to improve their operations through the use of appropriate technologies.

MEP engage in a variety of activities to assist manufacturers, often in partnership with other business assistance providers such as Small Business Development Centers, community colleges, and federal laboratories. MEP offer a wide range of business services, including helping companies (1) solve individual manufacturing problems, (2) obtain training for their workers, (3) create marketing plans, (4) implement Total Quality Management practices and/or an International Organization for Standardization (ISO) 9000 system,[3] and (5) upgrade their equipment and computers.

MEP work with both individual companies and groups of companies. NIST estimated that the MEP network it has helped fund since 1988 had reached a total of 25,000 small- and medium-sized manufacturers as of March 1995.

[3]ISO 9000 is a minimum set of industrial quality system standards. These standards ensure that a company's quality system is documented, demonstrable, effective, and maintained. ISO 9000 standards are established by ISO, comprising delegates from over 90 countries.

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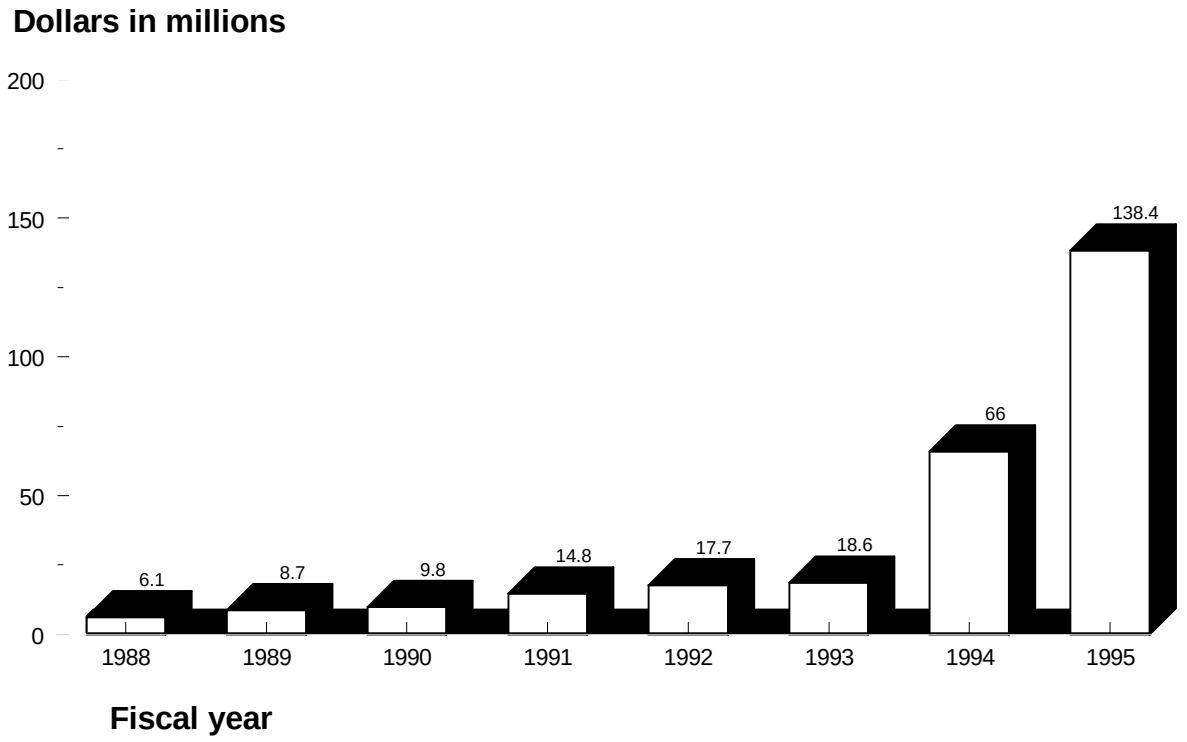
Total MEP Funding Through NIST in 1994 Dollars[a]



Note: Funding amounts include NIST and Technology Reinvestment Project (TRP) funds for MEP and for activities related to MEP.

[a]Funding for fiscal year 1995 is in 1995 dollars.

Source: NIST Budget Office.

A Growing State/Federal Partnership

Direct federal involvement in MEP began when Congress passed the 1988 Omnibus Trade and Competitiveness Act (Public Law 100-418, Aug. 23, 1988) after many states already had taken the lead in establishing MEP. NIST is the federal agency primarily responsible for overseeing federal MEP funding.

Federal MEP appropriations through NIST[4] have grown (in 1994 dollars) from approximately $6.1 million in fiscal year 1988 to $138.4 million in fiscal year 1995. In addition to funding individual MEP, NIST funds also have been used by states and by NIST to coordinate MEP and other business assistance activities. NIST currently is developing a strategic management plan and an evaluation system for MEP that belong to its national network.

State or local agencies are to provide matching funds for NIST grants to individual MEP. A 1995 Battelle Memorial Institute report[5] estimated that states collectively spent about $57.7 million specifically on MEP in fiscal year 1994. That same fiscal year, federal MEP spending was $66 million. Other sources of MEP support come from universities, private industry, and users' fees.

[4]NIST has allocated MEP funds from its budget as well as from the Technology Reinvestment Project (TRP) under the Advanced Research Projects Agency. Manufacturing Extension Programs (GAO/GGD-95-124R, Mar. 24, 1995) lists NIST and TRP MEP funding for fiscal years 1994 and 1995.

[5]Partnerships p. 55.

Views of MEP Users

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Methodology for Collecting Views of MEP Users

- Chose clients from 57 MEP in 34 states
- Chose clients that received at least 40 hours of MEP assistance in 1993
- Focused on most common types of MEP services
- Sent out 766 questionnaires, 551 completed responses (response rate of 72 percent)

How We Collected Views of MEP Users

In order to determine MEP users' views on (1) the impact of MEP services on their business performance and (2) the factors affecting the impact of these services, we mailed questionnaires to manufacturers that had received at least 40 hours of assistance from MEP in 1993.

The manufacturers we surveyed had received services from 57 MEP in 34 states. These MEP represented a broad range of organizations, including universities, nonprofit corporations, and state government agencies. The majority were established in the 1980s, although they ranged from 2 years to 49 years old. Median funding for individual MEP was about $1 million in fiscal year 1994. The federal government provided about 30 percent of the total fiscal year 1994 funding these MEP received. MEP also get support from state or local agencies, universities, private industry, and users' fees.

Participating MEP gave us the names of manufacturers who had received at least 40 hours of assistance in 1993 involving help in at least one of four categories: (1) Quality Improvement, (2) Product Design and Development, (3) Equipment Modernization and Plant Layout, and (4) Environmental or Energy. Our study focused on these types of services because they are typically offered by MEP. Also, MEP experts told us manufacturers should be able to identify the impact of these particular services on their business performance.

MEP gave us the names of 766 manufacturers who met our qualifications. We sent these manufacturers questionnaires tailored to ask about the specific type of MEP project they had completed in 1993. We received a total of 551 responses, for an overall response rate of 72 percent.[1]

[1]The majority of our survey respondents were manufacturers in four industries: fabricated metal products; industrial machinery and computer equipment; rubber and plastic products; and electronic and electrical equipment, except computers. About one-half of the respondents had under 100 employees; about one-third had between 100 and 300 employees. Respondents were fairly evenly distributed across three categories of fiscal year 1994 gross sales: about 29 percent earned over $1 million to $5 million; about 34 percent earned over $5 million to $25 million; and about 25 percent earned over $25 million.

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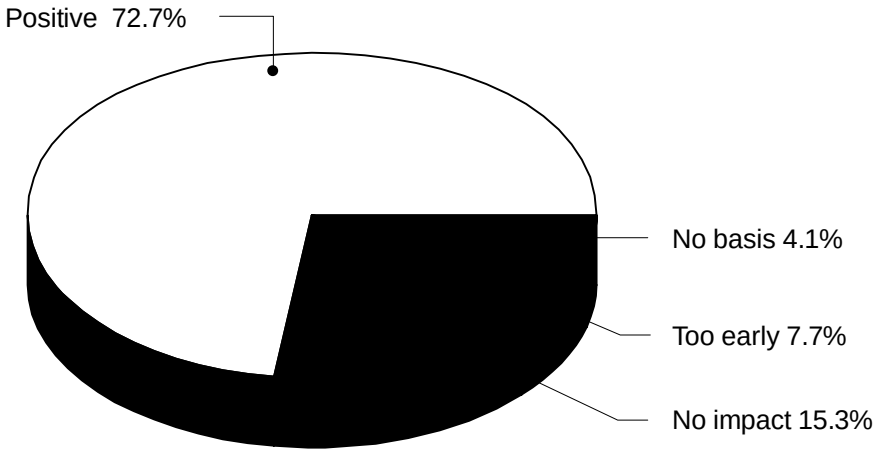
Overall Impact of MEP Services Received as Viewed by Clients

Percentage of total respondents' views



Note: Only one respondent (less than 1 percent) reported a negative overall impact.

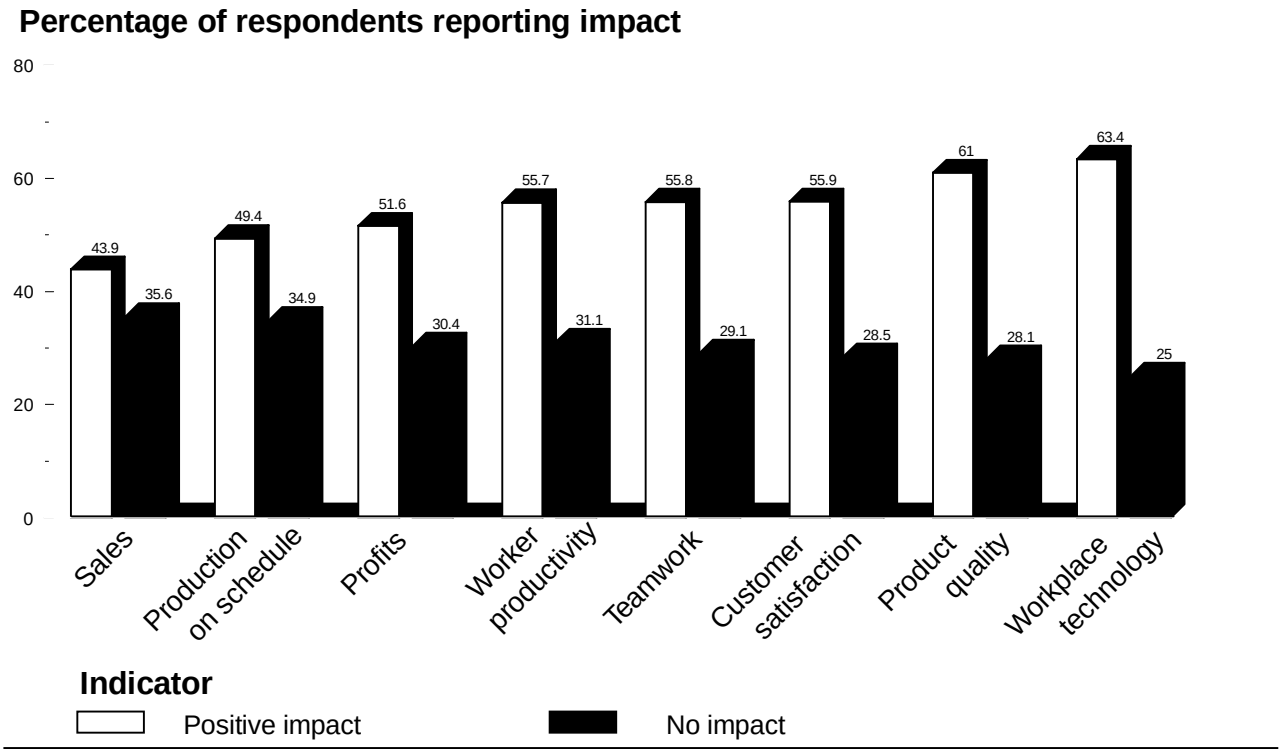
Source: GAO analysis of questionnaire data.

Most Companies Reported a Positive Overall Impact on Business Performance

Almost three-quarters (389) of manufacturers responding to our questionnaire reported that they believed MEP assistance had positively affected their overall business performance (i.e., the facilities' ability to work smarter, faster, and better). For example, one respondent reported that MEP assistance with changing its plant layout had resulted in reduced labor costs, improved product quality, and improved customer satisfaction. Another respondent reported that MEP quality improvement assistance had improved the work climate for employees, reduced employee turnover, and helped develop teams. Only one company reported that MEP assistance had negatively affected its overall business performance. This company commented that MEP advice regarding the timing of its manufacturing "fell short," which led to dissatisfaction of one of its customers and the loss of potential sales.

About 15 percent (or 82) of the respondents reported that they believed MEP assistance had not affected their overall business performance. Just under 8 percent (or 41) of the respondents said that it was too early to tell the effect of MEP assistance, while approximately 4 percent (or 22) said they had no basis to estimate the effect.

GAO Impact of MEP Assistance on Specific Performance Indicators



Note: About 2 percent, or fewer, respondents reported a negative impact on each specific performance indicator.

Source: GAO analysis of questionnaire data.

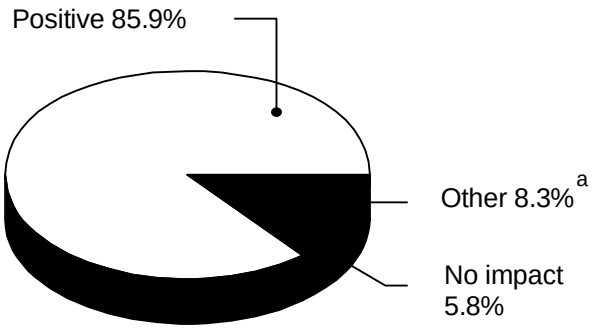
Most Manufacturers Believed MEP Services Improved Their Use of Technology and Their Product Quality

Regarding specific business indicators, most respondents reported that MEP assistance had positively affected their use of technology in the workplace (about 63 percent), the quality of their product (about 61 percent), and the productivity of their workers (about 56 percent). These responses indicate that MEP have had some success in achieving their primary goal of helping manufacturers improve their operations through the use of appropriate technologies and through increases in product quality and worker productivity.

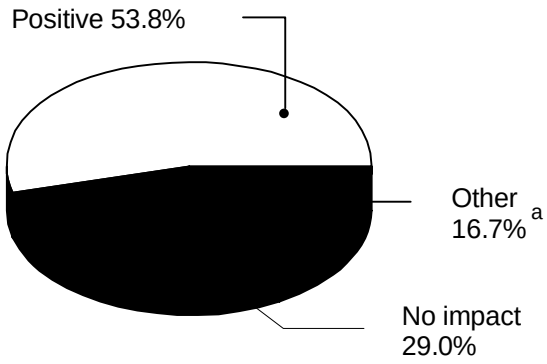
Others said the assistance had resulted in other positive outcomes, such as reducing energy consumption or attracting potential investors to new products under development. Overall, between about 44 percent and 63 percent of respondents reported that MEP assistance had positively affected certain specific indicators of their business performance, such as their customer satisfaction, their profits, and their ability to meet production schedules. Of those respondents not reporting a positive impact on specific indicators of their business performance, most said MEP assistance had not had any impact. About 2 percent, or fewer, respondents reported a negative impact on each specific performance indicator. Some of the manufacturers reporting no effect said they had not followed MEP suggestions, had put little time into the assistance, or had terminated their relationship with MEP before completing the assistance.

GAO Company Investment and Impact of MEP Services

Impact on Companies Making Financial Investment



Impact on Companies Making No Financial Investment



Note 1: No companies making financial investments reported a negative impact. Only one company (0.5 percent) that made no financial investment reported a negative impact.

Note 2: Impact reported as of January 1, 1995.

[a]Other: Companies responding too early to tell or no basis to estimate the impact.

Source: GAO analysis of questionnaire responses.

Companies That Had Made Financial Investments More Often Reported Positive Business Outcomes

Companies that had made financial investments (e.g., bought or upgraded equipment or plant facilities) to implement MEP recommendations reported greater benefits from MEP assistance relative to other survey respondents. Overall, 322 respondents (out of 550 responding to our question) said they had made financial investments as a result of MEP assistance.[2] Approximately 86 percent of these companies said MEP assistance had positively affected their overall business performance. However, about 54 percent of those who had not made a financial investment reported an overall positive impact.

Significantly, approximately 97 percent of the respondents who had made financial investments as a result of MEP assistance said that they believed that this investment had been worthwhile.

[2]Not all MEP assistance includes recommendations for financial investments.

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Attributes That Manufacturers Desired in MEP

- MEP staff with expertise and experience
- Reasonable service fees
- Reasonable project proposal costs

Manufacturers Desired MEP With Staff Expertise and Affordable Costs

About 93 percent of our survey respondents told us that they wanted MEP with expertise and experience to help them solve their problems. In personal interviews, manufacturers told us MEP assistance was successful because MEP staff had applied practical manufacturing experience to resolve their companies' problems.

The ability to afford both the costs of obtaining MEP assistance and implementing MEP recommendations was another important consideration for our survey respondents. About 91 percent of respondents said it was important that MEP fees, if charged, be "fair and reasonable" and that MEP project proposals be within their companies' financial means. Companies' financial capacity may be an important determinant of their ability to benefit from MEP assistance: some survey respondents (15 percent) cited budget constraints as one of the main reasons why they did not implement one or more MEP recommendations.

Views of MEP Nonusers

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Methodology for Survey of Firms Making Little or No Use of MEP

- Focused on four metropolitan areas with established MEP
- Identified firms similar to those sent written questionnaires
- Conducted telephone interviews with 200 selected firms

How We Assessed Why Manufacturers Made Little or No Use of MEP

In addition to sending a written questionnaire to MEP users, we conducted a telephone survey of 200 manufacturers who had made little or no use of these programs. Defining the universe of nonusers was difficult, because an estimated 93 percent of the 370,000 U.S. small- and medium-sized manufacturers had not used MEP.

We selected manufacturers to survey in four SMSAs that had established MEP (Atlanta, GA; Albany/Troy/Schenectady, NY; Kansas City, MO; and Los Angeles, CA). Using a commercial database, we identified manufacturers who were in the same industries and employed similar numbers of people as did the majority of manufacturers who had responded to our questionnaire. We then conducted structured telephone interviews with 50 firms in each area. We asked them if they had used MEP and what other sources they had used for technical assistance.

GAO Manufacturers' Reasons for Little or No Use of MEP

- Most interviewed (163 out of 200) unaware of MEP
- Manufacturers who were aware did not use MEP because they
  - solved problems by themselves or by using other sources
  - believed MEP had no relevant expertise
  - believed government should not be involved

Most Firms Interviewed Unaware of MEP

Most of the manufacturers we interviewed by telephone (163 out of 200, or 82 percent) said they were unaware of MEP and so had not used them. MEP officials attributed this lack of awareness to two reasons. First, the companies may have received mailings and other information from MEP, but they either did not read the information carefully or did not perceive its relevance to their own operations. Second, MEP officials told us that many state programs limit their marketing efforts in order to avoid creating a demand they cannot meet with their service resources. For example, the MEP in the State of New York had 17 field engineers to serve an estimated population of 28,000 potential manufacturing clients at the beginning of 1995 and thus had to limit its outreach efforts.

However, 29 of the 37 manufacturers who said they were aware of MEP told us they did not use MEP for a variety of reasons. Of these 29 manufacturers, 21 said they had not used MEP services because they believed the assistance would not be necessary. For example, 12 of these firms said they could largely solve their own problems or that they turned to other sources for help. In addition, three others said they believed the programs could not provide the relevant expertise they needed. Finally, two manufacturers told us that they believed that government resources should not be used to provide assistance to businesses.

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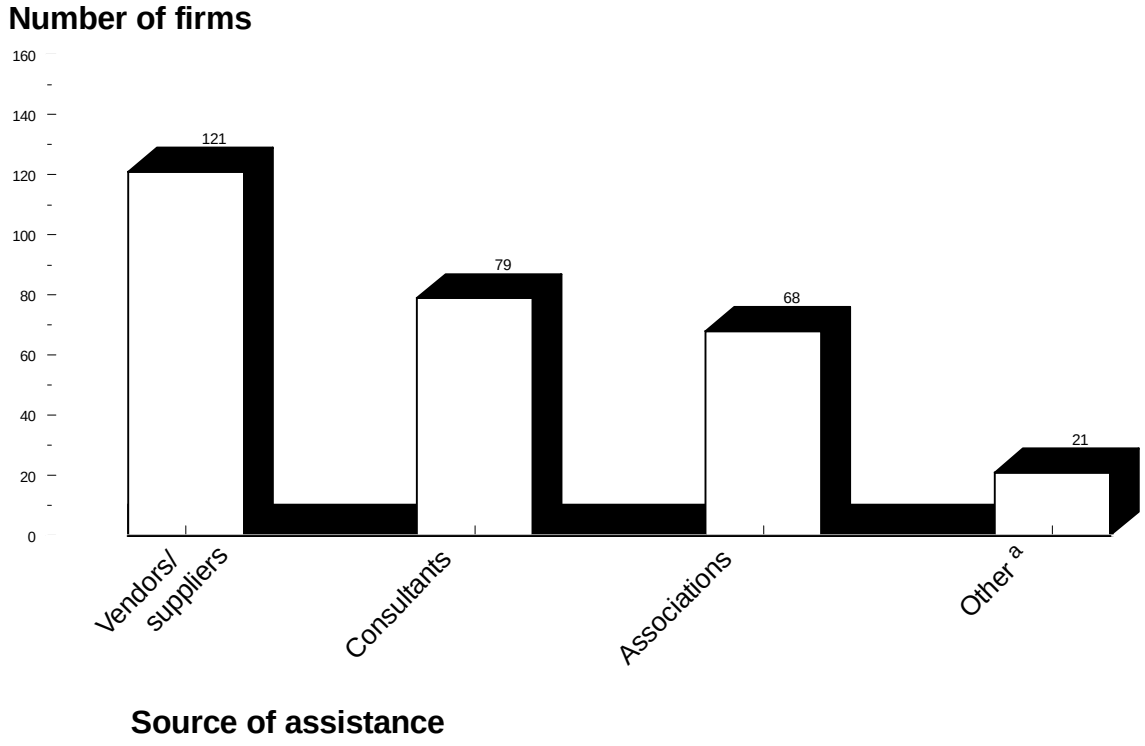
Other Sources of Technical Assistance Used by Firms



[a]Other includes customers, other corporate units, and other manufacturers.

Source: GAO analysis of telephone interview data.

Manufacturers Used Vendors, Suppliers, Consultants, and Trade Associations

Manufacturers we interviewed identified several sources of technical help they had used other than MEP and said they often had employed more than one of them. The most commonly used source of technical assistance was the firm's own vendors and/or suppliers. For example, a manufacturer that puts the final coating on a variety of products told us that whenever it has a problem with a coating not adhering to the surface of the product it is treating, it contacts either its equipment vendors or its raw material suppliers for help in solving the problem. Other sources of technical assistance included consultants, manufacturing associations, customers, and even other manufacturers.

Objectives, Scope, and Methodology

At the request of Chairwoman Constance A. Morella of the Subcommittee on Technology, House Committee on Science, we obtained manufacturers' views regarding the impact of MEP services on their business performance and the factors that affected the impact of MEP services. We did not verify either positive or negative impacts reported by manufacturers. In addition, we obtained the views of other manufacturers with little or no MEP experience regarding the reasons why they had made limited or no use of MEP services.

To identify manufacturers that had used MEP services to survey regarding the services' impact on their business performance and the factors that had affected the services' impact, we (1) developed criteria for the type of MEP our study would include, (2) located all MEP that fit our criteria, and (3) asked these MEP for their cooperation in supplying names of clients that met our survey criteria (described in the following paragraphs).

Since the term "MEP" could include a variety of programs and organizations, we consulted MEP literature and MEP experts to develop a set of criteria to use in identifying programs to include in our study. For the purpose of our study, we considered programs to be relevant if their primary function was to provide direct technical assistance to individual manufacturers, using program staff or supervised consultants. We defined technical assistance as one or more of the following activities:

- providing access to and encouraging use of innovative and/or off the shelf manufacturing technologies and processes;
- disseminating scientific, engineering, technical, and management information about manufacturing;
- providing access to industry-related expertise and capability in university research departments; and
- transferring advanced manufacturing (i.e., cutting edge) technologies and techniques to companies.

Our definition excluded business assistance programs such as the SBA's Small Business Development Centers; business incubators;[1] financial assistance, funding, and grant programs; joint research ventures with universities and/or federal laboratories; on-line technical database services; and industry networks.

[1]Incubator facilities provide office and lab space for start-up companies at below-market rates. Shared support services such as clerical, reception, and data processing often are made available.

We located 80 MEP that met our criteria for inclusion and had been established before 1994.[2] We used reports from the National Governor's Association, the Northeast-Midwest Institute, and the Battelle Memorial Institute that contained references to existing MEP as the basis for identifying programs that would possibly fit our criteria. We confirmed and updated information in these reports by conducting structured telephone interviews with all programs that we believed matched our criteria. We interviewed officials of a total of 114 programs in 40 states. Eighty of them met our criteria for inclusion and had been established before January 1994.

Fifty-seven[3] of the 80 MEP that qualified for our study supplied us with the names of clients that met our survey criteria. In an effort to determine if the qualified programs that provided client information differed from the qualified programs that did not, we compared the two sets of programs on the basis of age, total funding, federal funding, and type of administration. The results of the comparisons indicated that there were no significant differences between MEP that did and did not provide client data.

We asked the 57 participating MEP to select from their records all manufacturers that met specific criteria that we developed in consultation with MEP officials and MEP evaluation experts. The client had to meet the following criteria:

- It had to be a manufacturing facility, which means that its products had to belong to one or more of the manufacturing categories in the Standard Industrial Classification (SIC) codes.[4] Our survey excluded nonmanufacturing facilities, such as service providers or farmers.
- It had to have received at least 40 hours of MEP assistance[5] in 1993. Thus, when the facility received our survey in early 1995, at least 1 year would have elapsed since the MEP assistance ended. MEP evaluation experts have

[2]Since our survey focused on manufacturers receiving MEP services in 1993 (for reasons explained in the text) we limited our study to MEP that were operating before 1994.

[3]Of the remaining 23 MEP, 7 were willing to provide client information but did not have any clients meeting all of our survey criteria. Ten declined our request because of concerns over client confidentiality, three never responded to our request, and three others did not participate for other reasons.

[4]The Standard Industrial Classification is the statistical classification standard underlying all establishment-based federal economic statistics classified by industry. The classification covers the entire field of economic activities and defines industries in accordance with the composition and structure of the economy.

[5]The 40 hours need not have been consecutive. Assistance may have been provided by MEP staff or by consultants affiliated with MEP. In cases involving consultants, MEP should have performed a case management role.

told us that 1 year would have been sufficient time for facilities to be able to gauge the value of the assistance and its impact on their business performance. Experts also have told us that 40 hours would have been enough assistance to have had a potential effect on a manufacturer's business performance.

- It had to have completed assistance in one or more of the four categories defined below. In cases in which a manufacturer completed more than one type of assistance, we asked the MEP official to choose the primary assistance provided to the manufacturer (i.e., the assistance requiring the most MEP time and/or resources).

We did not verify the client information MEP provided against the programs' records.

The assistance categories we included in our survey were

Quality Improvement. Technical assistance in planning, developing, and implementing a quality system to help a manufacturer attain higher quality standards.

Equipment Modernization and Plant Layout. The evaluation and analysis of plant layout and equipment to determine the most efficient means of manufacturing or assembly through reorganization of the process flow through the facility, and/or upgrading, reconfiguring, or replacing manufacturing equipment.

Product Design and Development. Services to support the creation, enhancement, or marketing of a manufacturer's product.

Environmental or Energy. Assessment of hazardous materials, discharge, waste products, energy use, and other environmental effects within a manufacturing operation.

We chose these four assistance categories because they share important characteristics. They are types of assistance that MEP typically offer clients, so our survey potentially could include clients from most MEP. Also, the four types of assistance are defined in a similar way by most MEP, according to MEP officials. Other MEP services (such as worker training and strategic business planning) may vary considerably from one program to another. Finally, we selected types of assistance that are directed at clients' manufacturing operations. MEP clients receiving operations-related assistance were able to tell us (1) their expectations of how the assistance

would affect their operations and/or performance and (2) whether or not these expectations were met. Other types of MEP assistance—examples are material engineering, electronic data exchange, and computer upgrading—have effects on manufacturers' operations that are less visible and less easily measured. As a result, manufacturers may have difficulty determining the expected and actual impact of these types of services on their business operations and performance.

We designed four questionnaires, each focusing on one assistance category. In designing our survey questions, we obtained input from NIST and MEP officials, MEP evaluation experts, and managers at manufacturing facilities. We also reviewed client surveys that MEP used.

Each questionnaire contained identical questions to obtain background information about the respondent and to obtain respondents' views on the impact of MEP services on their business performance and the factors affecting the impact of MEP services. However, the four surveys also had unique questions asking about the expected and actual outcomes of the assistance, because each type of assistance focuses on a different aspect of a manufacturer's operations. We tailored these questions to ask about the kind of impacts that reasonably could be expected to result from the particular kind of assistance received.

As part of our survey development, we tested all four surveys with manufacturers in Texas, Iowa, New York, and Kansas who had received MEP assistance. We also interviewed manufacturers who had received MEP services in Maryland, Georgia, North Carolina, and South Carolina. MEP directors in those states had agreed to arrange for us to meet selected clients. We asked the manufacturers about their experiences with MEP services and the impact of those services on their business performance.

Our final surveys initially were mailed to a total of 843 manufacturers during the months of February 1995 through March 1995. Follow-up mailings were made through May 1995. Each manufacturer was sent one survey, based on MEP information on the primary type of service the manufacturer had received.

The primary reason manufacturers did not respond to our survey was their inability to recall MEP assistance they had received. We wrote letters asking the nonrespondents why they did not return our survey. We received responses from 60 companies out of 274 nonrespondents. About one-third told us that no one at their facility could recall the assistance

received in 1993 and/or that we had addressed the survey to a person who no longer worked at the facility. On the basis of this information, in addition to other information provided by our nonrespondents, we reduced our survey population from 843 to 766.

We obtained an overall response rate of 72 percent across all four surveys. Response rates varied from a low of 63 percent for the environmental/energy survey to a high of 76 percent for the quality improvement survey.

Our analysis of the companies that did and did not respond to our survey found nothing to indicate that our results would have been different if the nonrespondents had completed our questionnaire. The respondents and nonrespondents were similarly distributed across different geographic locations and different MEP.

To understand why other manufacturers had made limited or no use of MEP services, we conducted telephone interviews with 200 manufacturers with little or no experience with MEP services. Most (an estimated 93 percent) of U.S. small- and medium-sized manufacturers have not received assistance from NIST-funded MEP, according to available NIST data. We used a commercial database to identify manufacturers who

- had had little or no previous experience with MEP services;
- were in an area containing an MEP—they were selected from one of four SMSAs that contained MEP; and
- were in the same employment size range (20-300) and same four industries[6] as the majority of manufacturers that had responded to our questionnaire about MEP services.

We telephoned manufacturers until we completed interviews with 50 in each of the four SMSAs—Albany/Troy/Schenectady, NY; Atlanta, GA; Kansas City, MO; and Los Angeles, CA. In our interviews, we asked these manufacturers why they had made little or no use of program services and what resources besides MEP they used for modernization assistance. The results of these interviews were not generalizable to all small- and medium-sized manufacturers.

[6]These four industries were (1) fabricated metal products; (2) industrial machinery and computer equipment; (3) rubber and plastic products; and (4) electronic equipment and electrical equipment, except computers.

We performed our review in Washington, D.C.; Los Angeles; San Francisco; and New York between March 1994 and July 1995 in accordance with generally accepted government auditing standards.

Since we did not evaluate the operations or management of specific federal programs, we did not obtain agency comments on this report. However, on July 24, 1995, we discussed the facts presented in this report with the Director of the NIST Manufacturing Extension Partnership Program. He agreed with the technical accuracy of the report and offered minor clarifications which we incorporated into this report.

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