



THE MANUFACTURING EXTENSION PARTNERSHIP
Delivering Measurable Returns to Its Clients

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NIST

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The Manufacturing Extension Partnership

The Manufacturing Extension Partnership (MEP), a program of the U.S. Department of Commerce's National Institute of Standards and Technology, is a national network of manufacturing extension centers that provides services to small manufacturers to increase their competitiveness. Started in 1989, this partnership among the federal government, state and local governments, and industry consists of more than 400 manufacturing extension offices and centers providing services to small manufacturers located in all 50 states and Puerto Rico. Each center works directly with area manufacturers to provide expertise and services tailored to their most critical needs, ranging from process improvements and worker training to business practices and the application of information technology in their companies. Services are offered through a combination of direct assistance from center staff and assistance from outside consultants. MEP assists small manufacturers to increase their productivity growth, improve their profitability, and enhance their economic competitiveness.

Since the program began, small manufacturers have used the NIST MEP program more than 107,000 times. In 1999, MEP centers assisted over 23,000 manufacturers in areas including business systems, human resource management, manufacturing and process improvements, product development, and market development.

The more than 361,000 small manufacturers account for over half the total value of U.S. manufacturing production. They employ 11.4 million people and account for over two-thirds of all U.S. manufacturing employment. Critical as they are to the nation's economy, smaller manufacturers are less likely than larger

firms to know about and implement technology, modern manufacturing processes, and current business practices. As a result, the productivity gap between small and large manufacturers continues to widen. Between 1992 and 1997, the productivity gap between large and small manufacturers grew by 6.2 percent. As large firms increase their dependence on suppliers for parts and services, the performance and capabilities of small manufacturers become even more important to the competitiveness of all manufacturers and to the health of the U.S. economy. In addition, large manufacturers are requiring small firms in their supply chains to meet increasingly rigorous quality standards. Failure to comply can preclude small firms from important markets for their products.

The Survey Process

Since 1996, NIST MEP has sponsored a national survey of manufacturing center clients. The survey asks clients to comment on the business impact of the services provided by their local center. NIST MEP surveys manufacturing extension center clients for two primary purposes:

1. To collect national aggregate information on program performance and impact for national stakeholders. The survey provides information about the quantifiable impact on client firms of the services provided by MEP centers. NIST MEP also conducts other national level studies to evaluate the system's impact that corroborate and complement the results from the survey.
2. To provide center-specific impact information. Centers use this information to communicate results to their stakeholders, both at the state and federal level. Center managers and NIST MEP use results

to evaluate center performance and effectiveness. The MEP Center Review Criteria and review process place a strong emphasis on a center's ability to demonstrate impacts and uses the survey results in its program reviews.

The survey results also provide MEP centers with a tool to measure their center's performance and effectiveness and benchmark their performance against other centers and performance standards. In addition, the data allow NIST MEP to gauge the impact of the national MEP network on America's manufacturers.

Market Facts Incorporated (MFI), a nationally recognized survey research firm headquartered in Arlington Heights, IL, conducts the telephone survey. With more than 25 years survey experience and over 500 employees, this experienced firm brings some of the most modern survey-related technology to the project.

The survey is conducted four times each fiscal year. Each client is sent a letter announcing that they have been selected for the survey and that Market Facts will be contacting them to ask some questions about their experience and outcomes of their work with a center. Clients are selected for the survey based on when the firm completed its first project with a center in 1999. For instance, if a client had a project close on March 1, 1999, they would be surveyed in the first quarter of 2000. Clients that complete multiple projects with a center in a year are surveyed only once a year.

While clients are selected on the basis of when a project was completed with a center in 1999, the survey is client-based rather project-based. Only clients that completed a substantive activity (generally a project that lasted eight or more hours or the service was likely to result in some change in a firm's operations) with a center are surveyed. Clients that have gone out of business are excluded from the survey and clients surveyed in the prior year under the old survey process are also excluded. The survey asks clients to consider the entire set of services a center has provided over the past two years and to comment on how their business performance has been affected in the last 12 months. For instance, the typical client surveyed completed 2.2

projects with a center representing 123 hours of consulting services. Interviews with clients in the first quarter (n=1,536 clients) were conducted between March 23 and May 2, 2000, client interviews for the second quarter survey (n=1,836) were conducted between July 17 and August 14, 2000 and client interviews for the third quarter survey (n=1,302) were conducted between October 17 and November 14, 2000.

Client Impact Survey Results

Through Fiscal Year 1999¹, 4,674 clients were surveyed and 2,942 clients completed the survey. An overall response rate of 62.9 percent response rate was achieved. The survey asks clients to comment on the impact of MEP services in the following areas:

- Bottom-line client outcomes and impacts such as productivity increases, sales, technology, capital investment and cost savings;
- Intermediate outcomes such as improvements in manufacturing, sales/marketing, human resources, information and management systems; and
- Client satisfaction with the services provided.

These survey results, along with other studies that complement and corroborate these findings, show that the program has a positive impact on the companies it works with and makes a positive contribution to local, state, and the U.S. economy. The program is making a difference to companies in many different ways that contribute to significant improvements in many areas including bottom line benefits and internal improvements. Appendix One examines the characteristics of clients that responded to the survey and those that did not. Appendix Two contains a discussion of the confidence intervals for the survey results and Appendix Three for the actual survey and the results for each question based on the client responses.

Bottom Line MEP Client Impact Results

The MEP program is delivering measurable returns to its clients. The services provided are contributing to improvement in client competitiveness, productivity

¹These data reported represent responses for only the last three quarters of clients served in Fiscal Year (FY) 1999. A different survey instrument was used in the first quarter of FY 1999 and the results are not comparable to these results and thus are not included

improvements, and bottom line impacts by saving them money and increasing and retaining sales. Table One provides additional detail on the productivity improvements reported by MEP clients. Table Two provides more detail on the bottom-line impacts reported by the 2,942 MEP clients interviewed.

After receiving services:

- **MEP clients reported important productivity improvements and they are more competitive.**

Sixty-three percent of the clients responding to the survey reported productivity improvements across four broad dimensions. Nearly half of the clients reported improvements in process productivity and over 40 percent of the clients surveyed reported that either material or capital productivity improved as a result of services provided. Over one in three clients reported that labor productivity increased (See Table 1). Seventy-one percent said their company was more competitive as a result of the services they received.

Table One

PRODUCTIVITY IMPROVEMENTS REPORTED BY MEP CLIENTS

(n = 2,942 clients)

Productivity Measure	Clients Reporting Impact
Process productivity improvement	48%
Material productivity improvement	43%
Labor productivity improvement	34%
Capital productivity improvement	41%
Some aspect of productivity improved	63%

- **MEP services had a significant impact on company sales.**

As a result of the MEP services provided to small manufacturers, 45 percent of all clients' reported

that the services provided to their company had a sales impact through either increasing their sales or retaining sales that would have been lost. Twenty-five percent of the clients reported that sales increased and 37 percent of the clients responding stated that they were able to retain sales that would have been lost as a result of the services provided. These companies reported over \$1.4 billion dollars in total sales impact. Over \$447 million in new sales were generated and over \$998 million in sales were retained.

- **Clients' reported significant cost savings.** More than six in ten clients (64.7%) reported that the services resulted in cost savings in labor, materials, energy, investments or other areas and by avoiding unnecessary investments. MEP clients realized just under \$363 million in total cost savings.
- **MEP services leveraged new client investment.** Over 69 percent of all clients reported that they increased investment in some key area of their operations. MEP services leveraged significant new investments among small manufacturers that totaled over \$576 million dollars. New investments of over \$386 million were made in plant and equipment, \$73.7 million of new investment in information systems and software, and \$31.1 million in workforce training and workforce practices. Just over \$85 million in new investments were made in other areas including research and development.

Table Two

CLIENT REPORTED IMPACTS AS A DIRECT RESULT OF MEP ASSISTANCE

(n = 2,942 clients)

Business Impact	Qualified Impact
Increased/Retained Sales	\$1.4 billion
Cost Savings	\$364 billion
New Client Investment in Modernization	\$576 billion
Jobs Created	5,796 jobs
Jobs Retained	12,357 jobs

Intermediate Impacts on MEP Clients

The results below focus on the intermediate outcomes achieved by the MEP program. The program is helping firms increase their agility, saving them time and money, and contributing to important improvements in product quality, workplace practices, information systems and the increasing the efficiency and effectiveness of internal operations. These improvements are also an important source of productivity growth.

- Almost all clients reported important business performance improvements.**
 Nearly 86 percent of the clients responding to the survey reported that some key business performance metric improved as a result of the services provided to them including improvements in areas such as profitability, productivity, cost savings, investment, or jobs.
- Most clients say the services led them to take improvement actions that they would not have taken and took action more quickly.**
 Sixty-nine percent of the clients reported that they took actions that they would not otherwise have taken without the services provided. Over three-quarters of the clients responding said that they took actions more quickly as a result of the projects completed.
- Clients reported important improvements in manufacturing systems.**
 Sixty-five percent of the clients responding reported that throughput (the total volume of production through a plant) increased in their company. Fifty-six percent of the clients reported that the services improved product quality and 53 percent reduced lead-time.
- MEP clients report important improvements in human capital and work practices.**
 Seventy-one percent of the clients reported that employee skills improved as a result of the services provided and 68 percent of the clients said that the work environment for employees improved.
- MEP is helping small and mid-manufacturers to better manage information systems.**
 Forty-six percent of the clients responding to the survey reported that their use or selection of information systems or technology improved and 38 percent reported that their Y2K readiness improved.

- Clients report that MEP services have improved their management systems.**

Two-thirds of the clients reported that their business and strategic planning improved and 56 percent of the clients reported that the services improved their understanding of costs within their companies.

Clients are satisfied with the services provided and would use these services again. Figure 1 illustrates client satisfaction with the MEP services provided. Eighty-five percent of clients were very satisfied/satisfied with the quality of services they received. Figure 2 shows that 86% of clients definitely or probably would use MEP services again in the future.

Figure 1

HOW SATISFIED CLIENTS WERE WITH SERVICES PROVIDED

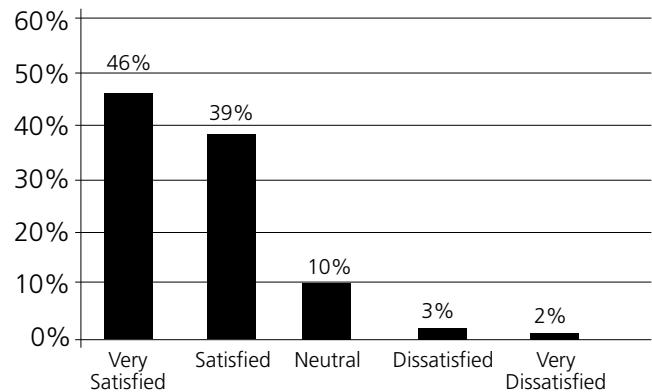
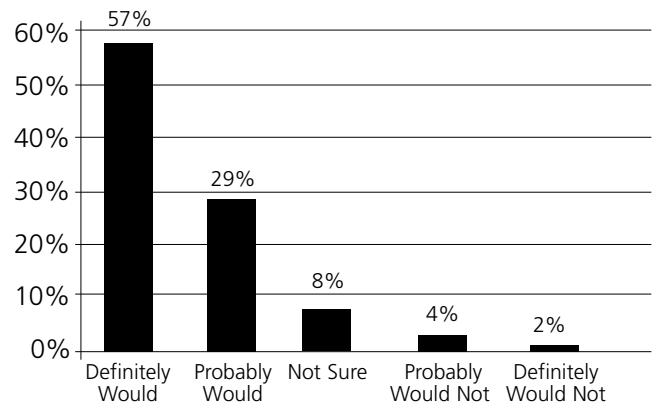


Figure 2

WOULD CLIENT USE SERVICES AGAIN?



APPENDIX 1: Characteristics of Respondents and Non-respondents.

This appendix explores the characteristics of the population selected for survey and examines whether there were important differences among those that responded to the survey and those that did not respond to the

survey. Overall, the characteristics of the respondents and non-respondents did not differ on several important dimensions.

Appendix Table 1.1

CHARACTERISTICS OF SURVEY RESPONDENTS & NON-RESPONDENTS IN TERMS OF SIZE CATEGORY

Employment Size Category	Survey Respondents (<i>n</i> = 2,942)	Survey Non-respondents (<i>n</i> = 1,732)	Total Population (<i>n</i> = 4,674)
0 - 19 employees	27.1%	23.7%	25.8%
20 - 99 employees	39.7%	39.3%	39.6%
100 - 249 employees	18.7%	20.0%	19.2%
250 - 499 employees	8.5%	10.7%	9.3%
More than 500 employees	6.0%	6.4%	6.2%

As Appendix Table 1.1 suggests, the portion of clients responding to the survey closely tracks the distribution of the total population. Smaller clients (i.e., those with

19 or less employees) were slightly more likely to respond to the survey as compared to larger clients (those with 250 or more employees).

Appendix Table 1.2

CHARACTERISTICS OF SURVEY RESPONDENTS & NON-RESPONDENTS IN TERMS OF PROJECTS COMPLETED

Number of Projects Completed	Survey Respondents (<i>n</i> = 2,942)	Survey Non-respondents (<i>n</i> = 1,732)	Total Population (<i>n</i> = 4,674)
1 Project	49.3%	56.5%	51.9%
2 Projects	21.8%	22.3%	22.0%
3 or more Projects	28.9%	21.1%	26.0%

There appears to be a positive relationship between the number of projects completed with a client and the probability of responding to the survey. This table suggests that clients that had only one project with a

center were less likely to respond to the survey and those with three or more projects were much more likely to respond to the survey.

Appendix Table 1.3

CHARACTERISTICS OF SURVEY RESPONDENTS & NON-RESPONDENTS IN TERMS OF LENGTH OF PROJECTS

Length of Projects	Survey Respondents (<i>n</i> = 2,942)	Survey Non-respondents (<i>n</i> = 1,732)	Total Population (<i>n</i> = 4,674)
0 - 15 hours	16.9%	20.8%	18.3%
16 - 31 hours	18.6%	19.1%	18.8%
32 - 57 hours	19.3%	20.8%	19.8%
58 - 127 hours	22.2%	19.2%	21.1%
More than 128 hours	23.0%	20.2%	22.0%

There also appears to be a direct relationship between the overall length of all projects completed and the likelihood of responding to the survey. Clients with higher levels of involvement with center staff were

much more likely to respond to the survey compared to those that had shorter periods of involvement with the center.

Appendix Table 1.3

CHARACTERISTICS OF SURVEY RESPONDENTS & NON-RESPONDENTS IN TERMS OF TOP FIVE INDUSTRIES SERVED

Industry	Survey Respondents (<i>n</i> = 2,942)	Survey Non-respondents (<i>n</i> = 1,732)	Total Population (<i>n</i> = 4,674)
Industrial Machinery & Equipment	18.1%	15.6%	17.2%
Fabricated Metal Products	13.9%	13.3%	13.7%
Electronic Equipment	8.7%	9.0%	8.8%
Rubber and Plastics	7.2%	7.6%	7.3%
Transportation Equipment	5.6%	5.3%	5.5%

Appendix Table 1.4 shows the distribution of respondents and non-respondents in terms of the top five industries served by manufacturing extension centers. Clients in industrial machinery and equipment and fabricated metal products were slightly more likely to respond to the survey while clients in rubber and plastics and electronic equipment were less likely to respond to the survey.

APPENDIX 2: Standard Error of the Estimates.

Any sampling approach involves the possibility that the results reported could be different from the true characteristics of the full population from which the survey is drawn. While the survey is not a sample, not all clients respond to the survey so it is useful to present some information on confidence intervals of our estimates. The likelihood that this is the case varies with two things: 1) the size of the sample, and 2) the observed distribution of the results in the sample. As far as the first is concerned, a sample size of 50 is generally regarded as the minimum necessary. As far as the latter is concerned, the closer to a 50-50 split exists in the distribution of the sample, the greater the likelihood that the sample result and the population result may be different. Because of the large sample size, the confidence intervals around each reported result are very narrow.

To express the degree of confidence in the results relying on a sample, statisticians compute a “standard error of the estimate” and a “confidence interval” for the results.² The confidence interval expresses the range on either side of an observed sample result that can be expected for the true value of the population to fall. The greater the degree of confidence wanted, the wider the confidence interval will be. Statisticians generally use a 95-percent confidence interval. This means that we are 95 percent confident that the true population proportion is in the specified range of the proportion reported based on the sample size.

The table below reports the confidence intervals for the full sample. This table shows a 95 percent degree of confidence that the true population proportion ranges between + 0.4 percent to + 1.8 percent of the observed proportion. This means, for example, that if 70 percent of the clients surveyed reported improvements in the skills of their employees, there is a 95 percent certainty that the true value in the entire population of MEP clients falls between 68.3 percent and 71.7 percent.

Appendix Table 2.1

STANDARD ERRORS OF ESTIMATES FOR GIVEN SURVEY RESULTS, 95 PERCENT CONFIDENCE LEVEL

Reported Result (Percent)	Sample Size (<i>n</i> = 2,942 respondents)
1	±0.4
10	±1.1
20	±1.5
30	±1.7
40	±1.8
50	±1.8
60	±1.8
70	±1.7
80	±1.5
90	±1.1
99	±0.4

² Alan Stuart, “Standard Error for Percentages,” *Applied Statistics*, Volume 12, Number 2 (1962 - 1963), pp. 87 - 88.

APPENDIX 3: Client Impact Survey National Results

(n=2,942 respondents)

1. Did the services you received lead you to:

- Take actions that you would otherwise not have taken?
Yes - 69.1%
No - 30.9%
- Take actions more quickly?
Yes - 75.6%
No - 24.4%
- Take actions at lower cost?
Yes - 61.4%
No - 38.6%

2. As a direct result of services you received, has your establishment experienced any of the following changes over the past 12 months in these areas of *manufacturing systems*?

- Reduced lead time
Yes - 53.3%
No - 46.7%
- Increased throughput
Yes - 65.3%
No - 34.7%
- Reduced work in process inventory
Yes - 42.8%
No - 57.2%
- Reduced defect rate
Yes - 56.0%
No - 44.0%

3. As a direct result of services you received, has your establishment experienced any of the following changes over the past 12 months in these areas of *marketing and sales*?

- Improved understanding of customers, markets, or competitors
Yes - 56.6%
No - 43.4%

- Improved customer development or retention
Yes - 62.7%
No - 37.3%

- Entry into new or better markets
Yes - 47.2%
No - 52.8%

4. As a direct result of services you received, has your establishment experienced any of the following changes over the past 12 months in these areas of *human resources*?

- Improved employee skills
Yes - 70.7%
No - 29.3%
- Reduced employee turnover
Yes - 33.4%
No - 65.6%
- Improved work environment for employees
Yes - 68.3%
No - 31.7%

5. As a direct result of services you received, has your establishment experienced any of the following changes over the past 12 months in these areas of *information systems*?

- Improved Y2K readiness
Yes - 38.3%
No - 61.7%
- Improved eCommerce capacity
Yes - 30.9%
No - 69.1%
- Improved use or selection of information systems or software
Yes - 46.4%
No - 53.6%

6. As a direct result of services you received, has your establishment experienced any of the following changes over the past 12 months in these areas of *management systems*?

- Improved business or strategic planning
Yes - 67.1%
No - 32.9%

- Improved understanding of actual costs
Yes - 56.8%
No - 43.2%

- Improved environmental management systems
Yes - 30.1%
No - 69.9%

7. As a direct result of services you received, has your establishment experienced any of the following changes over the past 12 months in these areas of overall performance?

- Increased inventory turns
Yes - 31.2%
No - 68.8%
- Achieved quality certification (e.g., QS 9000, ISO 9000)
Yes - 21.6%
No - 78.4%

- Improved profit margin
Yes - 40.7%
No - 59.3%

8. Did the services you received directly lead to any of the following differences in sales at your establishment over the past 12 months?

- Increase in sales
Yes - 25.4% How much? \$447,101,324
No - 74.6%
- Retention of sales that would otherwise have been lost
Yes - 37% How much? \$988,259,274
No - 63%

9. Did the services you received directly result in cost savings in labor, materials, energy, overhead, or other areas over what would otherwise have been spent in the past 12 months?

- Yes - 54.9% How much? \$246,992,044

Were cost savings more than 1% of annual sales?

- Yes - 48.1%
- No - 51.9%
- No - 45.1%

10. Did the services you received directly result in any of the following changes in employment levels over the past 12 months?

- Retention of jobs that would otherwise have been lost
Yes - 31.2% How many? 12,357
No - 68.8%
- Creation of additional jobs
Yes - 26.1% How many? 5,796
No - 73.9%
- Reduction in the number of jobs
Yes - 8.2% How many? 2,654
No - 91.8%

11. Over the past 12 months, were sales per employee higher than they would have been without services?

- Yes - 34%
How much higher?
- less than 1% 11.3%
- 1% - 3% 25.1%
- 3% - 5% 17.1%
- 5% - 10% 19.7%
- 10% - 20% 19.5%
- > 20% 7.1%
- No - 66%

12. Over the past 12 months, were your unit labor costs lower than they would have been without services?

- Yes - 37.9%
How much lower?
- less than 1% 14.8%
- 1% - 3% 26.3%
- 3% - 5% 17.2%
- 5% - 10% 21.6%

- 10% - 20% 15.0%
- > 20% 5.0%

- No - 62.1%

13. As a result of the services you received, has your establishment increased its investment over the past 12 months in:

- Plant or equipment?
Yes - 35.9% How much? \$386,102,315
No - 64.1%
- Information systems or software?
Yes - 33.9% How much? \$73,734,405
No - 66.1%
- Workforce practices or employee skills?
Yes - 48% How much? \$31,133,056
No - 52%
- Other areas of business?
Yes - 11.1% How much? \$85,274,920
No - 88.9%

14. As a result of the services you received, did your establishment avoid any unnecessary investments?

- Yes - 29.2% How much? \$71,941,760
- No - 70.8%

15. As a result of the services you received, did your establishment save on any investments that were made?

- Yes - 18.3% How much? \$44,873,934
- No - 81.7%

16. Is your establishment more competitive as a result of the services you received?

- Yes - 71.2%
- No - 28.8%

17. Did the services you received have any other

effects on your establishment during the past 12 months?

- Yes - 40.1% —Describe them.
- No - 59.9%

18. Are you satisfied with the quality of services you received?

- Very Satisfied 45.8%
- Satisfied 39.3%
- Neutral 10.3%
- Dissatisfied 2.6%
- Very Dissatisfied 2.0%

19. Would you use this program's services again in the future?

- Definitely Would 56.7%
- Probably Would 29.1%
- Not Sure 7.9%
- Probably Would Not 3.8%
- Definitely Would Not 2.4%

20. Do you have any suggestions about how we could serve your needs better in the future?
