BY JAN YOUTIE, PHILIP SHAPIRA & J. DAVID ROESSNER

TOOLS FOR PRACTICE

MANUFACTURING ASSISTANCE PROGRAM NEEDS ASSESSMENT GUIDE

VOLUME 1:

Regional Needs Assessment Approaches

The Aspen Institute
Community Strategies Group

BY JAN YOUTIE, PHILIP SHAPIRA & J. DAVID ROESSNER

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PREFACE

A manufacturing assistance program must—by definition—assess the needs of the manufacturers in its service area. Needs are manufacturing practices that fall short of, or can be improved with reference to, a benchmark or standard. Because no standard, validated benchmarks exist, however, definitions of need are often influenced by the goals and missions of the parties involved. Elected officials emphasize the need to save and create jobs; program administrators focus on upgrading manufacturing capabilities; manufacturing firms are concerned with profitability and survival. Even within a firm, the president, managers, and workers may each have different opinions about what the problems are and how to solve them.

Thus, needs assessments have a large subjective component. This subjectivity is compounded by the fact that programs have little opportunity to formally exchange information about the assessment tools and methods they use, and their strengths and limitations in various program contexts.

One way to reduce this subjectivity is to set down systematic approaches that draw on the collective experience of programs from around the country. The purpose of this guide is to describe approaches used and recommended by assistance program staff to assess manufacturers' needs.

The *Manufacturing Assistance Program Needs Assessment Guide* consists of two volumes:

- **Volume 1 covers regional-level needs assessment approaches.** Regional-level assessments aim at identifying and describing the characteristics of the manufacturing sector within the service area so as to best match program resources with needs across the area. This volume was written for directors of technical and management assistance programs serving private industry to help them during program start-up.

- **Volume 2 is an overview of approaches for conducting firm-level needs assessments.** These assessments involve one-on-one interactions between program staff and client firms to match program services and staff to clients based on individual firm needs. This volume was written primarily for directors of ongoing technical and management assistance programs.

These volumes can be used together or as stand-alone documents. The material they contain is complementary; taken together, it represents a resource

compendium on various approaches to conducting manufacturing needs assessments. As such, it may be used by audiences other than those listed above, including manufacturing assistance program planners and marketing staff, researchers of industrial policy and technology diffusion, people involved in economic development activities serving business, private sector management consultants, and industry and technology policymakers.

In using the material in these volumes, note the following:

- **This material is not intended to represent "best practices."** At this time, it is premature to think of best practices in this discipline, since the number of manufacturing assistance programs with long histories is small and represents an enormous diversity of experience.

- **Assessment tools and methods are continually evolving.** Because the practice of conducting needs assessments is rapidly evolving, this report is necessarily incomplete. New tools have been introduced, and older tools refined, since the writing of this guide. There has been no intent to exclude particular tools in this guide. The emphasis is on approaches to assessing need, rather than particular tools.

- **The inclusion of particular case examples, references and contacts are not intended to be endorsements.** The case examples represent typical approaches used rather than endorsed best practices.

- **There is no one "right" approach.** Manufacturing assistance programs differ substantially in terms of their mission, size and scope. They have broadly divergent client bases, and are located in economic regions with widely varying structures and conventions. Consequently, what works in one place and time may not in another. Tools and methods must be appropriately tailored.

INTRODUCTION TO VOLUME 1

What Is a Needs Assessment?

A basic function of a manufacturing assistance program is to assess the needs of the manufacturers in its service area. A **NEEDS ASSESSMENT** is a primary tool for allocating manufacturing assistance program resources such as field office locations and number and expertise of staff. Unless this critical first step is done—and done well—the assistance program cannot provide its services effectively or efficiently.

Needs assessments are not only applicable in the planning stages of a program, however. They are an important component of the service package to individual manufacturers. They play a major role in post-service evaluation efforts. And information from needs assessments is often required by funding sources.

NEEDS can be defined as manufacturing practices that fall short of, or can be improved with reference to, a benchmark or standard. Manufacturing assistance programs typically broaden this definition to include the likelihood that their services will be used—and used effectively. The key issue is not just that a firm needs assistance, but also that it seeks or is receptive to program services.

Types of Needs Assessments

Needs assessments are conducted to determine assistance needs either at a regional level (that is, for the entire service area) or for an individual firm.

- **REGIONAL-LEVEL ASSESSMENTS** consider issues such as "what are the important industry sectors in the service area?," "are there concentrations of manufacturers in certain regions within the service area?"and "where should field offices be located?" The tools and methods for conducting these assessments are described in this volume of the *Manufacturing Assistance Program Needs Assessment Guide.*

- **FIRM-LEVEL ASSESSMENTS** are one-on-one interactions between program staff and client firms and involve such tools and methods as plant tours, on-site interviews, flow diagrams, benchmarks and other analytic techniques. These assessments, which are described in Volume 2 of the *Manufacturing Assistance Program Needs Assessment Guide,* are used to match program service offerings, field staff and/or referral resources to client firms based on individual firm needs.

Purpose of Regional Needs

In the past, many programs provided a broad range of services to a broad base of manufacturers throughout the state or region. Decisions about which assistance

services should be allocated to which firms were not made until the field staff visited an individual firm. Sometimes program staff, drawing on experience, discovered that successful projects were based in firms with certain common characteristics. Or they recognized that particular problems and needs were common to firms of certain sizes and industry sectors. These rules of thumb were used from time to time to add or modify services.

Now some programs are using regional-level needs assessments to target their assistance services to segments of the manufacturing base in their region. A manufacturing assistance program may, for example, target:

- major industry sectors
- firms with certain problems or needs
- regions within a service area
- firms likely to use certain technologies ("technology-push" approach)
- defense-dependent firms needing conversion assistance
- firms likely to need and be receptive to certain services, for example heavy energy users in relation to assistance program energy audits

Using these assessments, programs can develop more efficient and effective resource allocation and service delivery plans. For example, some have decided to open specialized centers staffed by people with expertise useful to certain industry sectors, establish networks of manufacturers to address particular needs or problems and/or tailor field office staff expertise to the composition of the service area's industry base. Regional needs assessments prevent program planners with limited resources from spreading those resources too thinly.

Timing of Regional Needs

The various regional needs assessments methods and tools are used along a service delivery time continuum. This continuum consists of the following phases:

- conceptualization
- planning
- service delivery
- evaluation

Share analysis and **surveys** of major industry sectors are frequently used in the conceptualization phase of a manufacturing assistance program—

often, to obtain program funding. **Core industry analysis,** while useful in this phase, is less commonly performed because of its analytic complexity.

In the program planning phase, needs surveys and cluster analysis are often used to structure service offerings, field office locations and number of staff. Regional needs assessment information can be combined with "rules of thumb" about how many manufacturers a field engineer can serve in a year to arrive at staffing levels. Examination of concentrations of key industries in the region can help program administrators match staff engineers with experience in these key industries.

Technology use surveys and **advisory groups** can suggest the level of service offerings that might be appropriate for the region's manufacturing base. If surveys reveal low technology-adoption rates, services could be adjusted to focus on production process issues and generic technologies.

After service delivery, **historical program data** and **user group** advice can be analyzed to fine-tune program offerings. As an assistance program compiles a record of company assessments, the results may influence how resources are allocated in the program as a whole through summaries of historical program data. If these summaries indicate that many of the firms assisted fall into a particular industry sector, the program may elect to target this industry through modified service offerings and staff additions. Although virtually every program collects activity information, few conduct in-depth analyses of historical data and use this information to adjust service offerings or resource allocations.

Document Organization

This document is organized as a resource guide for conducting manufacturing needs assessments at the regional level. Seven approaches are presented in all; these are summarized in Table 1. (The order in which these approaches are presented does not imply any sort of ranking or preference.) The discussion of each approach consists of:

- a description
- a statement of its use and intentions
- one or more case examples showing how the approach has been used by actual manufacturing assistance programs
- summary of its strengths and weaknesses
- sources for more information

These discussions are followed by a section that addresses special considerations in assessing the needs of defense-related manufacturing firms.

TABLE 1. SUMMARY OF REGIONAL NEEDS ASSESSMENT APPROACHES

APPROACH	DESCRIPTION	USE	COMMENTS (STRENGTHS/WEAKNESSES)
1. SHARE AND LOCATION QUOTIENT ANALYSES	Shares are number of establishments or employees in a SIC divided by total number across all industries; location quotients identify industries with larger shares than in U.S. industrial base	Targets industries, federal funding proposals; most commonly used approach	Easy to calculate, but relies on out-of-date data; SICs are too broad; does not provide information about needs, receptivity, industry structure
2. CORE INDUSTRY ANALYSIS	Identifies industries making significant contributions to the economy in terms of manufacturing value added, linkages with goods producers, potential to increase exports or displace imports	Targets industries to maximize economic payoff, showing relationships between suppliers and large customers, providing basis for sector-specific regional needs assessments	Useful in regions dominated by a few vertically-integrated sectors; does not provide information about needs and receptivity; relies on dated information; complex to calculate
3. CLUSTER ANALYSIS	Identifies geographic concentrations of firms in a service area	Defines number, size and location of field offices within service regions; provides basis for localized regional needs assessments	Provides for efficient service delivery and tailoring, but does not provide information about needs and receptivity; relies on out-of-date data; data disclosure problems at county level
4. NEEDS SURVEYS	Surveys firms about problems or desired functions/capabilities	Suggests characteristics and size of potential client base, interest in service offerings and delivery mechanisms; federal funding proposals	Surveys are costly, time-consuming, and lack information about readiness to use services
5. TECHNOLOGY USE SURVEYS	Surveys firms about adoption of technologies and production system techniques	Suggests characteristics and size of potential client base, readiness for service offerings and delivery mechanisms; federal funding proposals	Lack of up-to-date benchmarks; industry-specific nature of technology use; surveys are costly, time-consuming
6. ADVISORY/ USER GROUPS	Groups of manufacturers with a common interest discussing issues	Generate and react to ideas for resource allocation priorities, program offerings, delivery approaches and referral sources; providing feedback for changed service approaches (user groups); prelude to additional regional-level needs assessment research	Helps obtain consensus and secure advocates, but potentially lacks focus and incentives for participation; results may not represent all firms in region
7. HISTORICAL PROGRAM DATA	Respond to firm requests for assistance; and compile and analyze characteristics of requesting firms, nature of problems, assistance provided and resources used	Determining resource allocation strategy/targeting, program offerings, field office locations, staff skills, referral priorities and delivery approaches	Directly reflects program experiences with firms, but difficult to categorize problems and assistance, representation of firm needs may be biased toward staff skills

This guide focuses on production process needs since these are central to the mission of most manufacturing assistance programs. Other functional areas—management, sales and marketing, and human resources, for example—are mentioned in the context of this focus.

APPROACH 1. SHARE AND LOCATION QUOTIENT ANALYSES

Description

Share and location quotient analyses are basic methods for identifying significant industries in a region. **SHARE ANALYSIS** determines which industries in the region have the largest share of establishments or employees. Industry shares are determined by dividing the number of establishments (or employees) in each manufacturing-related standard industrial classification (SIC) by the total number of establishments (or employees) in all manufacturing industries. Usually two-digit SICs are used for broad policy planning and three- or four-digit SICs for more specific program administration issues.

LOCATION QUOTIENTS identify those industries whose regional shares are larger than their shares in the U.S. industrial base. These quotients are calculated by dividing the proportion of a service area's economic activity in an industry by the proportion of the nation's economic activity in that same industry. Industries with location quotients greater than 1.0 are assumed to be critical to the service area's economy because they generate income through exports to other states or countries. Location quotients may be based on shares of establishments or employees to determine level of economic activity.

Sources of information used to calculate industry share and location quotients include the following:

- **GENERAL-PURPOSE MANUFACTURERS DIRECTORIES** (for example, *Manufacturing News, American Business News, Harris Industrial Directories* and the *Thomas Register*) based on surveys or company subscriptions

- **ON-LINE DATABASES,** such as *Dun & Bradstreet* and the *Electronic Yellow Pages*

- **GOVERNMENT PUBLICATIONS,** particularly those of the U.S. Census Bureau, such as *County Business Patterns* (which has annual statistics on number of establishments, employment and payroll by industry within each county based on firms' tax and regulatory records); *The Census of Manufactures* (various volumes summarizing a census of manufacturing establishments conducted every five years that provides data on number of establishments, employment, payroll, value of shipments, cost of materials, value-added and capital expenditures by states, metropolitan statistical areas, counties, places, industry groups and individual industries); and *Annual Survey of Manufacturers* (various volumes summarizing roughly the same kinds of data as in *The Census of Manufactures,* but drawn from an annual survey of manufacturing establishments based on a probability sample)

Use

Share and location quotient analyses can be used to target services (allocate resources) to certain segments of manufacturers. In general, however, these methods confirm what is already known from experience about which industry sectors contain the largest number of establishments.

Share analysis is the most commonly used regional needs assessment tool. It is most often conducted during program planning. Because of the simplicity and low cost of the analysis, industry shares can be calculated at any stage in service delivery as part of an ongoing market intelligence effort. Additionally, share analysis provides information often needed to obtain federal funding.

Case Example

INDIANA BUSINESS MODERNIZATION AND TECHNOLOGY CORPORATION (BMT), a statewide industrial extension program, used location quotient analysis in its initial planning to obtain insight into the state's manufacturing base. *(See Table 2.)* BMT calculated location quotients for selected manufacturing sectors in the state for 1980 and 1986, and compared the results with those for the United States as a whole. The researchers also examined employment growth from 1980 to 1988.

This analysis revealed that the fastest growing sector with a location quotient greater than one was miscellaneous plastic products. This sector grew by nearly 57 percent over the period. Between 1980 and 1986, it increased its contribution to Indiana's basic economic activity relative to national economic activity, with location quotient increases from 1.60 to 2.17. BMT is now creating a plastics center and plastics injection molding networks. Location quotient analysis provided important data for the decision, but other information (for example, historical program data) was critical to BMT's industry targeting decision.

Strengths

Share and location quotient analyses are comparatively easy, low-cost ways to identify the relative importance of industrial sectors.

Weaknesses

1. Share and location quotient analyses do not indicate other characteristics about manufacturing firms or sectors—such as needs, readiness for assistance, significance in the economy or interrelationships among firms.

2. One of the biggest problems with these forms of analysis is that they tend to rely on out-of-date information. Sources such as the *Annual Survey of Manufacturers* and *County Business Patterns* are usually two or three years out of date, and the *Census of Manufactures* can be as much as five years out of date. Industry classifications are dated as well. Many new companies will show up in miscellaneous categories because they do not easily fit into established ones. Also, industry categories may be too broad to be helpful. For example,

TABLE 2. LOCATION QUOTIENTS FOR SELECTED MANUFACTURING SECTORS IN INDIANA, 1980 AND 1986

		EMPLOYMENT				LOC. QUOT.: INDIANA VS. U.S.	
SIC	INDUSTRY SECTOR	1980	1988	GROWTH	1980-88	1980	1986
308	Miscellaneous Plastic Products	21,470	33,620	12,150	56.6%	1.60	2.17
384	Surgical, Medical, & Dental Instruments	4,550	6,975	2,245	53.3%	1.12	1.34
275	Commercial Printing	9,730	13,460	3,730	38.3%	0.90	1.01
243	Millwork & Plywood	8,260	10,400	2,140	25.9%	1.86	1.94
371	Transportation Equipment	49,580	59,310	9,730	19.6%	2.48	2.67
382	Laboratory App. & Analytical, Optical, Measuring & Controlling Instruments	7,000	7,445	445	6.4%	0.95	0.95
283	Drugs	16,930	16,970	40	0.2%	3.58	4.34
271	Newspapers: Publishing and/or Printing	10,730	10,720	(10)	(0.1%)	1.05	1.04
344	Fabricated Metal Products	14,680	14,150	(530)	(3.6%)	1.21	1.38
367	Electronic Components & Accessories	13,810	13,300	(510)	(3.7%)	1.00	0.83
354	Metalworking Machinery & Equipment	13,070	11,790	(1,280)	(9.8%)	1.51	1.79
346	Metal Forging & Stampings	15,280	12,960	(2,320)	(15.2%)	2.20	2.42
365	Audio, Video Equipment & Recordings	24,560	17,600	(6,960)	(28.3%)	8.43	12.47
353	Constuction, Mining, & Materials Handling Machinery & Equipment	6,110	4,160	(1,950)	(31.9%)	0.93	0.97
331	Blast Furnaces, Basic Steel	68,123	37,250	(30,873)	(45.3%)	5.37	6.42
366	Communications Equipment	14,704	5,341	(9,363)	(63.7%)	1.08	0.66

Source: Indiana Corporation for Science and Technology, "State Technology Strategy: Final Report" (Indianapolis, November 1989).

share and location quotient analyses might highlight printing and publishing firms, but these firms could be either quick-copy stores or manufacturers of printing equipment. SIC review on a company-by-company basis is the most accurate—although time-consuming—way to address these problems.

3. As a corollary to (2), above, comparing changes in industry shares over time may be difficult when the methodologies or definitions used to generate the data change.

About the case example:

For More Information

1. Robert B. Bassler
   Indiana BMT Corporation
   One North Capital, Suite 925
   Indianapolis, IN 46204-2242
   317-635-3058

DATA:

2. U.S. Bureau of the Census. *County Business Patterns.* Washington, DC: U.S. Government Printing Office. 1992. For sale by the Superintendent of Documents, U.S. Government Printing Office (paper); and Bureau of the Census, Data User Services Division (disk).

3. U.S. Bureau of the Census. *Census of Manufactures.* Washington, DC: U.S. Government Printing Office. 1992. For sale by the Superintendent of Documents, U.S. Government Printing Office (paper); and Bureau of the Census, Data User Services Division (disk).

4. U.S. Bureau of the Census. *Annual Survey of Manufacturing.* Washington, DC: U.S. Government Printing Office. 1991. For sale by the Superintendent of Documents, U.S. Government Printing Office.

APPROACH 2. CORE INDUSTRY ANALYSIS

Description

Core industries are those that make significant contributions to the economy, such as the auto industry in the Midwest. Core industries may be defined as having:

- a large share of manufacturing value added ("value added" refers to the value of shipments/manufactured products plus receipts for services minus the direct costs of materials/supplies and indirect costs)
- the potential to increase exports or displace imports of manufactured products
- strong linkages with intermediate goods producers, for example, larger anchor firms that use manufactured outputs from smaller suppliers

Although core industries are often dominated by large corporations, large corporations may not always be a region's core industries. Because many manufacturing assistance programs serve small and medium-sized firms, core industry analysis aims to identify smaller suppliers to these large corporations. These links among companies are not always intuitive; core analysis consequently requires significant data manipulation and analysis.

Tools to measure import substitution or linkages include input-output models such as the Bureau of Economic Analysis Regional Input-Output Modeling System (RIMS) II model, which estimates demand for various products by industry.

Use

Core industry analysis can be used in planning as the basis for targeting resource allocation strategies. It provides management information about the relationship between smaller supplier firms and larger core industries. It can also generate other needs assessment research: Once the core and supplier industries are identified, their needs can be further defined by customizing other assessment tools and methods to answer industry-specific questions.

Very few manufacturing assistance programs employ core industry analysis, in part, because it requires an economic analyst with a high level of sophistication. An interested program would probably contract with an outside source such as a faculty economist or consulting firm to conduct the core industry analysis.

Case Example

MICHIGAN'S MIDWEST MANUFACTURING TECHNOLOGY CENTER (MMTC) uses the following strategy in its core agglomeration analysis, which uses a funneling

approach to successively select or eliminate industry segments from the manufacturing population. The strategy consists of three tasks, as outlined below and illustrated in Figure 1.

1. To determine important export industries, MMTC uses two measures: (1) total value of exports and (2) total state/region employment. Export figures are provided by Regional Economic Models, Inc. (REMI), a firm that specializes in modeling the input-output flows of state economies. Employment data are provided by State Employment Security files (ES-202).

2. To find the industries that are major suppliers to the exporters, MMTC uses national-level data to identify the major inputs to each of the exports identified in task 1. Next, researchers confirm whether the state/region produces these inputs in sizable quantities, and—if so—they check REMI estimates of the degree to which state/regional suppliers actually sell their output to state/regional customers. Supplier industries that pass through this screening are those that have substantial area employment and are closely linked to area exporters.

3. MMTC researchers use Census Bureau data to identify exporter and supplier industries with substantial core industry components—which MMTC calls "foundation firms." The Census Bureau's County Business Patterns provides industry estimates of the average number of employees per plant as well as the number of plants that have between 20 and 500 employees.

In Michigan, MMTC researchers found that a large number of smaller firms supplied parts and components to the state's two major (large-corporation-dominated) industries—automotive assembly and office furniture. The analysis identified four supplier sectors that account for a very high proportion of automotive and office furniture value added—tooling and machine shops (for example, dies and molds), metal stamping, machine tools and industrial equipment, and plastic processing.

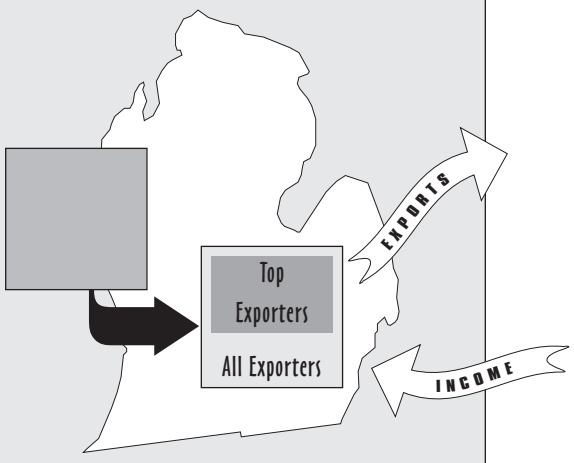
MMTC has since structured much of its manufacturing assistance program around service offerings and delivery mechanisms (for example, supplier networks) aimed at the four sectors identified through this analysis. It followed up the core industry analysis with sector-specific needs assessment analyses such as needs surveys and benchmarking. *(See Volume 2 of this guide.)*

Strengths

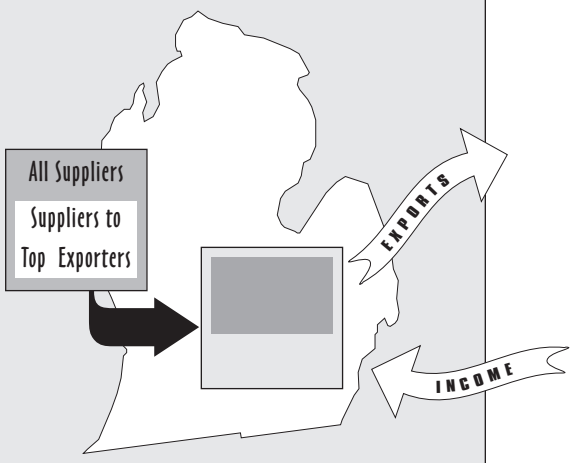
Core industry analysis provides important information for targeting industries that have a significant effect on other firms in the region, thereby maximizing economic payoffs. It is particularly appropriate for regional economies dominated by a few industry sectors that have a value chain from raw materials to finished goods located in the region.

FIGURE 1. IDENTIFYING MICHIGAN'S CRITICAL FOUNDATION FIRMS

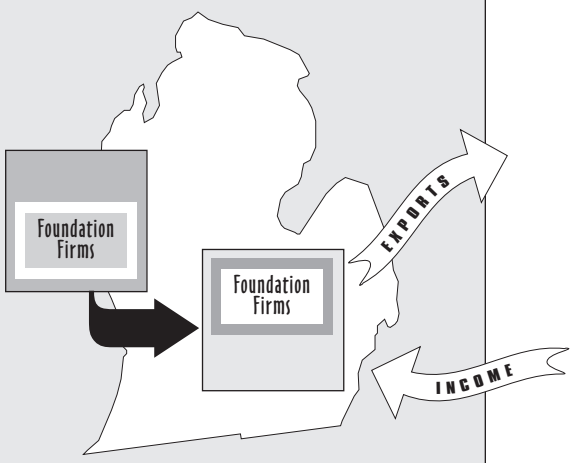
Task 1:
DETERMINE MICHIGAN'S IMPORTANT EXPORT INDUSTRIES



Task 2:
FIND MAJOR SUPPLIERS TO THE IMPORTANT



Task 3:
FIND FOUNDATION FIRM SECTORS AMONG IMPORTANT EXPORTERS, SUPPLIERS



Source: Industrial Technology Institute, Midwest Manufacturing Technology Center, Ann Arbor, MI.

Weaknesses

1. For economies that are characterized by diverse unrelated branch plants, there may not be a sufficiently large concentration of industry sectors to target.

2. Core industry analysis does not necessarily indicate readiness to adopt new technologies.

3. Like share and location quotient analyses, core industry analysis suffers from dated published information that reflects relationships among industries that may have existed several years ago but no longer hold true today.

For More Information

Sample tools:

1. Luria, Daniel, Roland J. Cole, and Alan Baum. "When Industrial Policy Arrives: The Allocation of Manufacturing Extension." Report prepared for the Industrial Technology Institute, Ann Arbor. October 22, 1992.

   Daniel Luria
   MMTC
   P.O. Box 1485, 2901 Hubbard Road
   Ann Arbor, MI 48106
   313-769-4377

2. Carmen Tigler
   U.S. Bureau of Economic Analysis
   BE-61 READ
   1441 L Street, NW
   Washington, DC 20230
   202-606-9900

About the case example:

3. Fogarty, Michael S., Stephen J. Gage, and Jar-Chi Lee. "Expanding the MTC Program: Economic and Design Considerations." Paper presented at the Technology Transfer Conference, Ann Arbor, MI. June 28-29, 1993.

   Stephen J. Gage, President
   CAMP/GLMTC
   4600 Prospect Avenue
   Cleveland, OH 44103
   216-432-5300

4. Georgia Institute of Technology. "Input to DARPA on Manufacturing Extension: Allocating Resources and Designing the Program." Report prepared for Economic Development Institute, Georgia Institute of Technology, Atlanta. 1992.

   Robert Lann
   Economic Development Institute
   Georgia Institute of Technology
   Atlanta, GA 30332
   404-894-3475

APPROACH 3. CLUSTER ANALYSIS

Description

Cluster analysis identifies geographic concentrations of firms in a service area. Cluster numbers and sizes are based on information about firms gathered at a subregional geographic level, usually county-level. Cluster analysis can be based on the numbers of establishments or on the concentrations of core industries; the latter requires some preliminary analysis before the cluster analysis can be performed. One useful measure derived from this approach is cluster density, which is calculated by dividing the number of establishments in each county by the number of square miles. Another useful measure is time/travel distance.

This information is often combined with county coordinate data and displayed in map form. The numbers and boundaries of clusters may be determined through simple methods such as eye-balling these maps and delineating regions around metropolitan statistical areas (MSA). More systematic statistical analyses based on Euclidean distances may also be used. The distinctive characteristics of each cluster are presented so that service strategies may be tailored accordingly.

Use

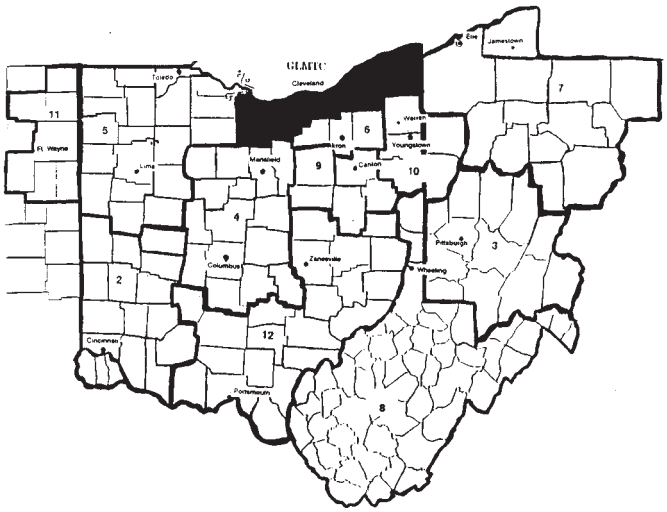
Nearly all manufacturing assistance programs use some sort of cluster analysis in their planning stages to define their service regions. Generally, these analyses lean more toward the "eye-balling" end of the scale and away from more sophisticated, rigorous analyses.

Cluster analysis addresses such questions as "into how many service regions should I divide my state?" "Which counties should go into which regions?" "Where should I locate the field office to serve the region efficiently and effectively?" Once service regions have been established, additional needs assessment analyses are often conducted at a smaller geographic level to depict the characteristics and needs of firms in a particular service region.

Case Example

THE CLEVELAND ADVANCED MANUFACTURING PROGRAM'S GREAT LAKES MANUFACTURING TECHNOLOGY CENTER (CAMP/GLMTC) used cluster analysis to extend its service delivery beyond greater Cleveland. *(See Figure 2.)* Researchers conducted disjoint cluster analysis to aggregate manufacturing establishments into geographic clusters; they incorporated density, manufacturing share and driving time in their calculations. This information was paired with county coordinate data for mapping. Twelve clusters were identified, including some MSAs (Cleveland, Akron and Toledo). To date, seven of these clusters have

FIGURE 2. DISTRIBUTION OF MANUFACTURING CLUSTERS AROUND THE GLMTC



CLUSTER: CLEVELAND/LORAIN/NORTHEASTERN OHIO

COUNTY	NUMBER OF MANUFACTURING ESTABLISHMENTS	NUMBER OF MANUFACTURING EMPLOYEES	PRIMARY SIC'S AND PERCENTAGES FOR 60% OR MORE OF ALL CLUSTER ESTABLISHMENTS
Cuyahoga	4,647	373,783	35-Ind. mach—29%
Lake	889	33,768	34-Fab. metal—18%
Lorain	561	56,793	27-Printing—9%
Ashtabula	198	11,099	30-Rubber—6%
Geauga	193	11,254	
Erie	149	11,608	
Huron	126	11,047	
Totals	**6,763**	**509,352**	**62%**

NUMBER OF MANUFACTURERS WITHIN A CLUSTER

1.	Cleveland/Lorain/Northeastern Ohio	6,763
2.	Dayton/Cincinnati/Northern Kentucky	5,638
3.	Southwestern Pennsylvania	3,686
4.	Columbus/Mansfield	2,651
5.	Toledo/Lima	2,764
6.	Akron and surrounding areas	2,173
7.	Northwestern Pennsylvania	1,899
8.	West Virginia	1,811
9.	Canton and surrounding areas	1,450
10.	Youngstown/Mahoning Valley	1,422
11.	Northeastern Indiana	1,273
12.	Southeastern Ohio	718
	Total	**32,107**

Source: Cleveland Advanced Manufacturing Program, Great Lakes Manufacturing Technology Center, Cleveland, OH.

been organized into satellite areas to be served primarily by local providers (for example, consultants, community colleges).

Industry sector share analysis of the firms in each cluster was performed, highlighting those primary SICs that accounted for 60 percent or more of all cluster establishments. Industrial machinery/equipment and fabricated metal products had a strong presence in most clusters; furniture and printing and publishing were the leading industries in two clusters.

Strengths

Cluster analysis lets a manufacturing assistance program serve its area more efficiently. More firms can be serviced with less travel time, and service delivery can be tailored based on knowledge about the characteristics of the firms in the cluster.

Weaknesses

1. Cluster analysis does not indicate whether firms in a particular cluster are likely to need, be ready for or desire assistance services.

2. As with the other approaches described, the input data can be dated and inaccurate. For example, to protect the anonymity of firms in counties with very small business bases, the Census Bureau's *County Business Patterns* reports cite results in ranges. The midpoint of the range can be used to estimate the numbers of employees and firms in a county, but these are only approximations.

For More Information

About the case example:

1. Fogarty, Michael S., Stephen J. Gage, and Jar-Chi Lee. "Expanding the MTC Program: Economic and Design Considerations." Paper presented at the Technology Transfer Conference, Ann Arbor, MI. June 28-29, 1993.

Stephen J. Gage, President
CAMP/GMTC
4600 Prospect Avenue
Cleveland, OH 44103
216-432-5300

APPROACH 4. NEEDS SURVEYS

Description

A needs survey asks manufacturing firms directly about their needs or problems. Firm representatives are asked a series of questions—by telephone, by mail or in person—aimed at determining specific manufacturing assistance needs. Examples of questions posed include the following:

- What are the most critical issues facing your business today?
- What are your firm's or industry's greatest problems?
- What are the most costly components of your operation?
- In what areas do you think your firm or firms in your industry need to modernize?
- What types of assistance are most needed by your firm or firms in your industry?

In addition to designing the survey, manufacturing assistance programs put much effort into compiling an accurate, complete listing of manufacturers. This compilation begins with such common sources as state manufacturers directories and Department of Labor listings. However, because these lists tend to be incomplete (due to new incorporations, out-of-business firms, relocations, and so forth), verification is vital.

Such data verification is performed by checking available data against other lists and published statistics, reviewing the data at the local service provider level and calling companies to validate information. Finally, decisions are made regarding survey administration and sample size—for example, whether to survey a sample of manufacturers or to conduct a census of every firm identified. In making these decisions, standard survey research methods are followed.

Use

Manufacturing assistance programs conduct needs surveys early in their planning process; follow-up surveys are conducted when program administrators feel needs have changed. Needs surveys can be used to determine the characteristics of firms that might be interested in participating in the assistance program and the types of assistance services they might need. Also, needs surveys can collect opinion information about alternative delivery mechanisms such as networks and brokered services. Findings from needs surveys can be combined

with published information about the population of manufacturers to estimate the potential size of a program's customer base. Also, survey results provide useful information to include in proposals for federal funding.

Case Examples

Georgia

Georgia Institute of Technology's Economic Development Institute conducted needs surveys of manufacturers in 1989 and 1992. Based on information in the state's manufacturers directory, all identifiable manufacturers with 20 or more employees were mailed a survey questionnaire. The surveys included a list of 63 problems, and asked respondents to rate the level of magnitude of each problem, and to indicate their interest in receiving assistance to address the problem. Problems were listed in the following categories: finance and accounting, taxes, manufacturing and production, labor, energy, management, marketing, information systems and processing, insurance and government regulations.

In 1992, more than one-third of the respondents who perceived the following as problem areas wanted information and/or assistance: strategic planning, total quality management, employee involvement programs, self-managed teams, quality assurance and ISO 9000. Comparing results to those from the 1989 survey suggested that the need for assistance is growing in areas relating to information technologies, quality management, energy, the environment and safety. Survey information was used to obtain federal funding under the Technology Reinvestment Project.

Michigan

MMTC conducted needs surveys of firms in four industry sectors: tool and die, plastics, machine tools and metal forming. One-page questionnaires were constructed for each sector, based on previous surveys and field engineer input. *(See Figure 3.)* These surveys were aimed at determining technology needs within each sector. Items were worded in terms of desired outcomes or capabilities (for example, "better approaches to extend die life," "more consistent, higher quality human resources"); firms were asked to rank each item by its relative importance.

The surveys were sent to a sample of companies, stratified according to four-digit SICs to represent the four sectors. The companies first received an orientation phone call followed by fax delivery of the survey. Survey results showed that the mix of needs varied considerably among sectors, although human resources ranked relatively high across all sectors, except machine tools. Program adminis-

FIGURE 3. RATING TECHNOLOGY NEEDS: MACHINE TOOLS QUESTIONNAIRE

INDUSTRIAL TECHNOLOGY INSTITUTE

Your title: _____

Location of your facility: __MI __OH Number of employees: __20-100 __101-499

Does your firm currently use computer numerically controlled equipment? _____

For each of the following needs please RANK its importance for machine tools builders. Place a "1" beside the need which you think is most important, a "2" beside the need which you think is next most important, a "3" beside the need which is third most important, and continue numbering until you place a "17" beside the need which is least important.

____ Improved techniques for design for manufacture and design for assembly.

____ Improved reliability and maintainability of machine tools.

____ Better approaches to global market and product development.

____ Alternative approaches to reducing environmental impact of machining operations.

____ Better approaches that promote access for machining and minimize contamination of fixtures and material handlers (e.g., fixtures).

____ Better approaches to control and removal of chips for high speed machining.

____ Better approaches to monitor and control machine operations and to compensate for errors (e.g., balance, thermal distortion, geometric positioning).

____ Improved means for rapid and accurate generation of holes.

____ Improved techniques for evaluation of simultaneous, multiple sensor input.

____ Improved position sensors.

____ Improved actuators to handle higher forces and greater displacements.

____ Improved surface sensing.

____ Better approaches to integrating non-traditional machining techniques (e.g., lasers, water jet, ultrasonics) in machine tools.

____ Better machine tool guarding (e.g., access, noise reduction).

____ Improved techniques for maximizing manufacturing operations per work station.

____ Increased flexibility in controls and drive electronics.

____ More efficient and effective means of coolant monitoring and reclamation.

Other (specify): _____.

Please return to the Industrial Technology Institute, c/o MMTC Technology Rating
2901 Hubbard Rd.
Ann Arbor, MI 48105
FAX: 313-769-4064

Source: Industrial Technology Institute, Midwest Manufacturing Technology Center, Ann Arbor, MI.

trators used these results, together with other assessment tools, to define sector-specific service offerings.

Strengths

Needs surveys provide direct information from manufacturers about their problems and interests.

Weaknesses

1. Needs surveys do not indicate companies' level of sophistication or their receptiveness to assistance services.

2. Planning, administering and analyzing surveys is a complex, time-consuming process.

3. Misleading conclusions can result from mistakes in survey administration or interpretation. Also, incomplete listings of manufacturers will produce results that do not represent the needs of the population. Low rates of completed questionnaires reduce the usefulness of the results.

4. Poorly worded, extremely lengthy surveys can create ill-will among manufacturers.

For More Information

About the case examples:

1. Georgia Tech Research Institute, KPMG Peat Marwick, and Georgia Chamber of Commerce. "Addressing the Challenges of the '90s: 1992 Survey of Georgia Manufacturers." Report prepared for the Georgia Institute of Technology, Atlanta. 1992.

   Robert Lann
   Economic Development Institute
   Georgia Institute of Technology
   Atlanta, GA 3033
   404-894-3475

2. Ostrowiecki, Beverly A., William Loomis, Michele Speers, and Louis G. Tornatzky. "Technology Needs in Four Sectors: A Field Study of MMTC Client Companies." Report prepared for the Midwest Manufacturing Technology Center, Ann Arbor. November 20, 1992.

   Beverly Ostrowiecki
   MMTC
   P.O. Box 1485, 2901 Hubbard Road
   Ann Arbor, MI 48106
   313-769-4020

APPROACH 5. TECHNOLOGY USE SURVEYS

Description

Technology use surveys catalog the current manufacturing practices of firms in a program's service area. These surveys ask about adoption of various technologies and production system techniques. The results may then be compared to previous surveys or national benchmarks. Program administrators may infer needs by examining the difference between potential client firms' technology use and benchmarks.

Use

Technology use surveys can help build a case for establishing an assistance program by showing that rates of technological adoption among firms in the service area fall below national benchmarks such as the U.S. Department of Commerce, *Current Industrial Reports: Manufacturing Technology*. *(See Figure 4.)* These surveys thus yield important information for funding proposals.

Technology use surveys can also indicate the types of services and delivery mechanisms for which manufacturers with various characteristics are ready. For example, programs finding that their manufacturing base does not have a high rate of technology adoption may have to begin with nontechnological process improvements followed by off-the-shelf, generic technologies. Subsequent survey efforts can then determine whether the technology adoption rate has increased with service provision.

Case Example

West Virginia University researchers conducted surveys of technology use in 1989 and 1993. The purpose of the 1989 survey was to help make the case for establishing an industrial extension service; such a service was instituted in 1991. The 1993 survey was conducted to examine the use and effect of the extension service on technology adoption as well as to update the 1989 survey. For both surveys, the questionnaires included items about:

- use of hardware-based manufacturing technologies
- use of production system techniques
- future plans for technology use and obstacles inhibiting investment in new technologies
- sources of information and assistance
- research and development and training programs

FIGURE 4. SURVEY OF MANUFACTURING TECHNOLOGY

DUE DATE: 30 DAYS AFTER RECEIPT

OMB No. 0607-0623: Approval Expires 06/89

FORM **SMT-1**
(7-19-88)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

SURVEY OF MANUFACTURING TECHNOLOGY

Please complete this form and RETURN TO

BUREAU OF THE CENSUS
1201 East Tenth Street
Jeffersonville, IN 47133

Please refer to Definition of Terms on the reverse side of the transmittal letter.

NOTICE — Response to this inquiry is **required by law (title 13, U.S. code).** By the same law, your report to the Census Bureau is **confidential.** It may be seen only by sworn Census employees and may be used only for statistical purposes. The law also provides that copies retained in your files are **immune from legal process.**

In correspondence pertaining to this report, please refer to this Census File Number (CFN)

Section A — TECHNOLOGY USE

INSTRUCTIONS

For EACH of the technologies listed below, mark (X) in the column that best reflects this plant's use of or plans for that technology. Report each technology separately even though it may be used within a "cell" or "system". Be sure to mark the appropriate column 4 – 6 if there are no plans to use the technology.

		Used in operations	Not currently used in operations				
			Plan to use within:		No plans to use because:		
			The next 2 years	2 – 5 years	Does not apply to operations	Not cost effective	Other
		(1)	(2)	(3)	(4)	(5)	(6)
1. DESIGN AND ENGINEERING							
a. Computer aided design (CAD) and/or computer aided engineering (CAE)	11						
b. CAD output used to control manufacturing machines (CAD/CAM)	12						
c. Digital representation of CAD output used in procurement activities	13						
2. FABRICATION/MACHINING, AND ASSEMBLY							
a. Flexible manufacturing cell(s) (FMC) or system(s) (FMS)	21						
b. NC/CNC machine(s)	22						
c. Materials working laser(s)	23						
d. Pick and place robot(s)	24						
e. Other robots	25						
3. AUTOMATED MATERIAL HANDLING							
a. Automatic storage and retrieval system (AS/RS)	31						
b. Automatic guided vehicle systems (AGVS)	32						
4. AUTOMATED SENSOR BASED INSPECTION AND/OR TESTING EQUIPMENT							
a. Performed on incoming or in process materials	41						
b. Performed on final product	42						
5. COMMUNICATIONS AND CONTROL							
a. Local area network for technical data	51						
b. Local area network for factory use	52						
c. Intercompany computer network linking plant to subcontractors, suppliers, and/or customers	53						
d. Programmable controller(s)	54						
e. Computer(s) used for control on the factory floor	55						

PLEASE CONTINUE ON REVERSE SIDE →

Section B — CHARACTERISTICS OF THIS ESTABLISHMENT

1. How many years has this establishment manufactured products at this location?

01
- 1 ☐ Less than 5 years
- 2 ☐ 5 to 15 years
- 3 ☐ 16 to 30 years
- 4 ☐ Over 30 years

2. How would you characterize the nature of manufacturing at this plant?

02
- 1 ☐ Fabrication/Machining
- 2 ☐ Assembly
- 3 ☐ Fabrication/Machining and assembly
- 4 ☐ Neither fabrication/machining nor assembly

3. What is the average market price for most products of this plant?

03
- 1 ☐ Less than $5
- 2 ☐ $5 to $100
- 3 ☐ $101 to $1000
- 4 ☐ $1001 to $2000
- 5 ☐ $2001 to $10,000
- 6 ☐ Over $10,000

4. What is the market for most products of this plant?

04
- 1 ☐ Consumer (personal use by household)
- 2 ☐ Commercial (e.g. offices, hospitals, services, etc.)
- 3 ☐ Industrial (manufacturing, mining, construction, and utilities)
- 4 ☐ Transportation
- 5 ☐ Government
- 6 ☐ Other
- 7 ☐ Can't specify

5. Are any of the products produced in this plant manufactured to military specifications?

05
- 1 ☐ Yes
- 2 ☐ No
- 3 ☐ Don't know

6. Are any of the products manufactured at this plant shipped directly to Federal defense agencies (such as the Department of Defense, Departments of the Army, Navy, Air Force, Marine Corps, the Defense Logistics Agency, etc.)?

06

Yes — **What percentage (based on value of goods and services) of all products manufactured at this plant are shipped to Federal defense agencies on an annual basis?**
- 1 ☐ 1 – 25%
- 2 ☐ 26 – 75%
- 3 ☐ Over 75%
- 4 ☐ Don't know

5 ☐ No

6 ☐ Don't know

7. Are any of the products manufactured at this plant shipped to other companies that are prime contractors to Federal defense agencies.

07

Yes — **What percentage (based on value of goods and services) of all products manufactured at this plant are shipped to prime contractors on an annual basis?**
- 1 ☐ 1 – 25%
- 2 ☐ 26 – 75%
- 3 ☐ Over 75%
- 4 ☐ Don't know

5 ☐ No

6 ☐ Don't know

Section C — VERIFICATION

Please check to make certain that one column is marked for EACH of the technologies listed in section A and one box is marked for EACH of the characteristics in section B. This is very important since it affects our ability to process the survey results.

THANK YOU FOR YOUR COOPERATION

Remarks

Section D — CONTACT

Name of person to contact regarding this report		Telephone		
		Area code	Number	Extension
Title of contact	Date			

FORM SMT-1 (7-19-88)

Source: U.S. Bureau of the Census, Current Industrial Reports: Manufacturing Technology: 1988 (Washington, DC: 1989).

- workforce educational gaps
- plant managers' perceptions of their technological capabilities
- type of technology support needed
- manufacturer characteristics

By comparing 1989 survey data with Census data, the researchers found that manufacturers in the state lagged behind the rest of the nation and other industrialized nations in their adoption of technology and advanced production practices. Results from the 1993 survey suggested that manufacturers had gradually improved their overall technological capabilities—a conclusion based in part on findings for a segment of firms that had participated in the previous survey. Researchers suggested that the program might emphasize assistance in such "soft technology" areas as organization, marketing and shop-floor troubleshooting rather than the purchase of high-tech equipment.

Strengths

Technology use surveys provide management information directly related to program goals about increased adoption of new technologies. They suggest which services clients will be most ready to use, and can indicate whether companies are better off, from a technology-adoption perspective, as a result of being served by the program.

Weaknesses

1. Technology use surveys share the weaknesses of needs surveys.
2. In designing technology use surveys, some questions are likely to be irrelevant to certain industry sectors. For example, asking about the use of statistical sampling for quality assurance makes sense for high-volume shops but not for small-volume custom shops. Similarly, moldmakers don't do tryout molding or extrusion, but diemakers do. Moldmakers use experiments to optimize resins; machine shops do not in specifying steels. Some programs address this problem by conducting surveys tailored to a dominant industry sector.
3. Due to the lack of up-to-date technological benchmarks across industries, inferences about firm needs based on current technology usage are subjective.

For More Information

About the case example:

1. Rephann, Terance, and Philip Shapira. "1993 Survey of Technology Use in West Virginia Manufacturing: Preliminary Report." Report prepared for the Regional Research Institute, West Virginia University, Morgantown. 1993.

Terance Rephann
Regional Research Institute, West Virginia University
Morgantown, WV 26506-6825
304-293-3800

Sample instrument:

2. U.S. Bureau of the Census. *Current Industrial Reports: Manufacturing Technology: 1988.* Washington, DC: U.S. Government Printing Office. 1989. For sale by the Superintendent of Documents, U.S. Government Printing Office (paper); and Bureau of the Census, Data User Services Division (disk).

APPROACH 6. ADVISORY/USER GROUPS

Description

Advisory or user groups (including focus groups) can be used to identify and assess manufacturers needs. **Advisory groups** are groups of companies in a common industry sector or with a common problem or interest, such as quality. **User groups** are composed of manufacturers who have received assistance services.

In using an advisory group, the aim is to put together a homogeneous group of industries that represent a dominant industry sector. A program might structure an advisory group by working with some of the major trade associations in its service area or by organizing a group around a large manufacturer, its vendors and suppliers.

The group may be further refined by taking trade association or supplier lists and segmenting according to company size, SIC or geographic region. In service areas not dominated by a particular manufacturer or organized trade association, a program may work with the local chamber of commerce or other economic development organization.

Advisory groups should have a facilitator at their meetings to stimulate discussion and keep it focused on industry needs. The facilitator poses a series of broad, open-ended questions to group members; examples of these questions include the following:

- What are the most critical issues facing your business today?
- What are your firm's or industry's greatest problems?
- What are the most costly components of your operation?
- In what areas do you think your firm or firms in your industry need to modernize?
- What types of assistance are most needed by firms in your industry?
- What are the most important industries in your region?
- What are the most significant unsolved problems that impede manufacturers' growth in this region?
- What are your perceptions of strengths and weaknesses in this region's manufacturing industry?

Next, the information from these group-based needs assessments is analyzed to identify common issues, problems and opportunity areas. (Irrelevant issues beyond the scope of the program—such as inadequate water and sewer capacity—are excluded.) This information is then combined with secondary source data on number of establishments or employment by SIC to help set priorities for industry concentrations.

Use

Virtually all assistance programs have advisory groups with manufacturing representation as part of their organizational structure. User groups are less widespread.

Advisory groups can provide guidance to program managers at any stage in the assistance program process. These groups are particularly useful in generating and reacting to ideas for resource allocation priorities, program offerings, delivery approaches and referral sources. Users groups are appropriate after service delivery as an evaluation feedback mechanism for changing service approaches.

Group processes are also useful as a prelude to additional regional-level needs assessment research. For example, they can assist in designing questionnaires, pretesting and suggesting methods for survey administration.

Case Examples

Connecticut

The Connecticut State Technology Extension Program (CONN/STEP) used a focus group process to help plan program offerings. Initially, a focus group was held with the program's general advisory panel. Because of the wide cross-section of manufacturers represented, however, the continuity of the discussion was difficult to maintain despite the presence of a facilitator. Organizers corrected this problem by holding industry-specific groups directed at common problems such as scrap reduction. Four three-hour groups were conducted.

- A group of ten machining companies, contacted through their trade association, participated in a discussion of scrap rate. The session opened with the vice president of a successful machine shop presenting his company's program for quality enhancement and scrap reduction; it concluded with a discussion of technology problems common to machine shops.

- Seven plastic injection molding companies, contacted through their trade association, participated in a session that opened with an expert from a large firm presenting the latest injection molding techniques; a discussion of common production problems followed.

- A third session was held with six biotechnology companies, opening with a presentation from the head of biotechnology research at the University of Connecticut.

- Twenty-one firms using computer-assisted design/computer-assigned manufacturing (CAD/CAM) technology participated in a fourth session in which the speaker was a CAD/CAM vendor representative.

Organizers found that providing information to the participants in exchange for obtaining their insight on needs and problems was an effective approach. Among the lessons program administrators learned from these discussions were: (1) firms prefer to work with an engineer rather than being told how to implement a change, and (2) group solutions such as flexible networks are more likely to work within some industry segments than others. To investigate the applicability of these findings to the general population of manufacturers, CONN/STEP management is using information from these groups to conduct a statewide needs survey.

Indiana

Indiana business modernization and technology corporation began its manufacturing extension program with volunteer, broad-based regional advisory groups representing Indiana's manufacturing base and quality networks in each of BMT's 14 regions. BMT has since expanded its advisory boards to include manufacturing representatives from each of the state's 92 counties. These members, along with other public and private sector representatives (bankers, economic development representatives, and so forth), focus on identifying networks and needs.

Strengths

1. Advisory groups reveal needs not previously thought of by the program administrator.

2. Advisory groups obtain consensus on these needs among key industry players.

3. The advisory group process secures advocates for program offerings and delivery mechanisms.

4. By forming networks of large customers and smaller suppliers, it is much easier for larger customers to communicate needs and for smaller suppliers to resolve problems associated with meeting those needs.

Weaknesses

1. It can be difficult to keep the conversation focused in advisory groups. Failure to structure and facilitate these groups greatly diminishes their usefulness.

Unstructured group discussions can be dominated by one or two participants.

2. It can be difficult to provide incentives for manufacturers to participate in a group discussion on needs assessment, since the direct payoffs are not as clear as they would be in a discussion on joint production or marketing, for example.

3. Results from advisory groups may not reflect the needs of the population of firms in the state or region.

For More Information

About the case examples:

1. Peter LaPlaca
   CONN/STEP
   368 Fairfield Road
   Storrs, CT 06269-2041
   203-486-2684

2. Robert B. Bassler
   Indiana BMT Corporation
   One North Capitol, Suite 925
   Indianapolis, IN 46204
   317-635-3058

APPROACH 7. HISTORICAL PROGRAM DATA

Description

One approach to assessing needs is to offer an assistance program for a period of time, respond to requests, and compile records of characteristics of the requesting firms, nature of the problems, assistance provided and resources used. Analyzing these data could help indicate the needs of manufacturing clients in the service area.

Use

Almost all programs collect data to fulfill their reporting requirements. Analyzing these data in the context of customer needs is less common.

Historical program data can address management issues regarding resource allocation strategies, program offerings, field office locations and delivery approaches. Analysis of requestor characteristics may suggest a targeting approach. Comparisons of problems and types of assistance provided by field engineers can help determine which engineers in which offices have the skills and experience most appropriate for the various needs in the region. Problem areas for which in-house expertise is lacking can suggest hiring priorities and the importance of identifying referral sources. Examining the geographic locations of requestor firms can have implications for field office positioning.

Case Example

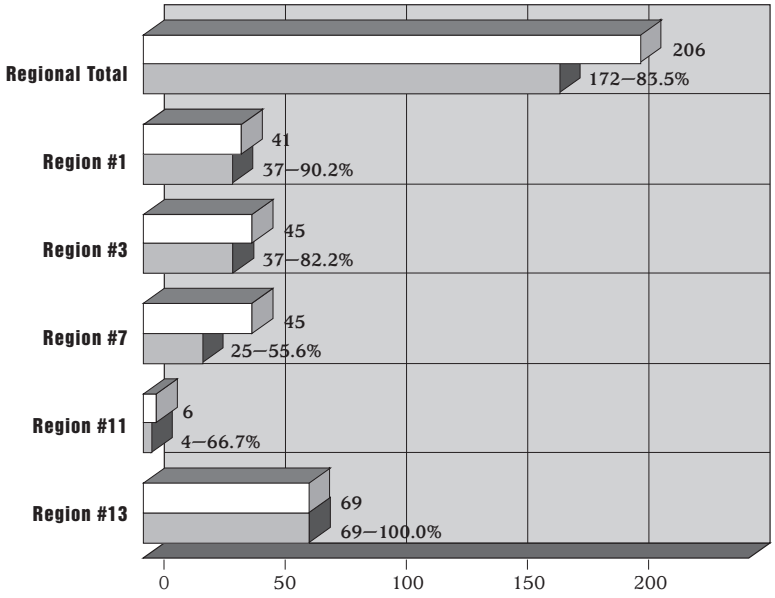
THE INDIANA BUSINESS MODERNIZATION AND TECHNOLOGY CORPORATION uses a feedback database program to track the daily activities of regional field engineers and thereby help target new assistance services. BMT established an extensive database of clients, which contains: (1) information about companies obtained through a personal visit; (2) needs, issues and opportunities identified and actions taken; and (3) resources used in assisting companies. These data are classified and coded by industry and for each firm-level assessment and assistance service. BMT's functional service categories are:

- business and its product or service
- sales/marketing
- manufacturing operations
- financial
- quality

FIGURE 5. FEEDBACK PROGRAM DATABASE ANALYSIS

MANUFACTURING CONTACTS—JANUARY 1991 THROUGH JUNE 1991

TOTAL NUMBER OF MANUFACTURING CONTACTS COMPARED TO ACTUAL NUMBER SERVED



Number of contacts

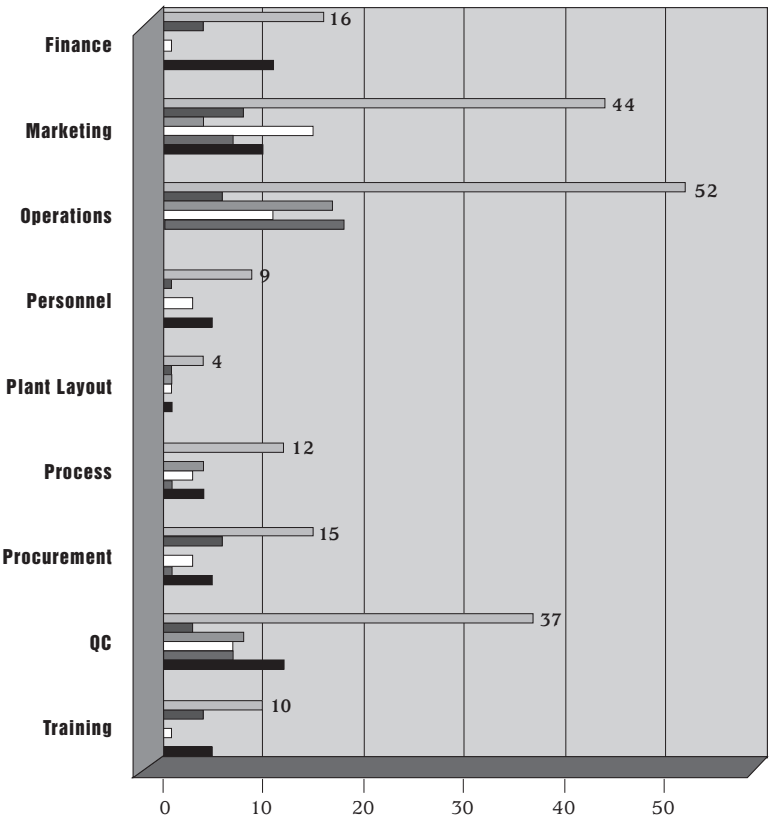
Number served**

**These numbers do not include multiple actions with one contact.

Source: MTS Paradox Database

SELECTED PROBLEM AREAS—JANUARY THROUGH JUNE 1991

NUMBER OF TIMES PROBLEM ENCOUNTERED



All Regions

Region 1

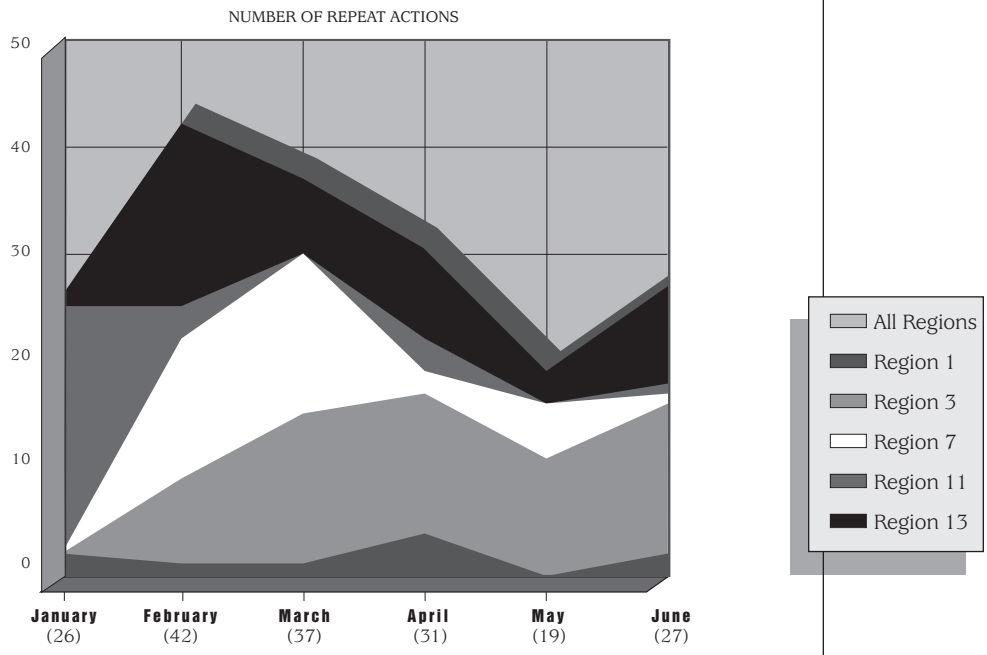
Region 3

Region 7

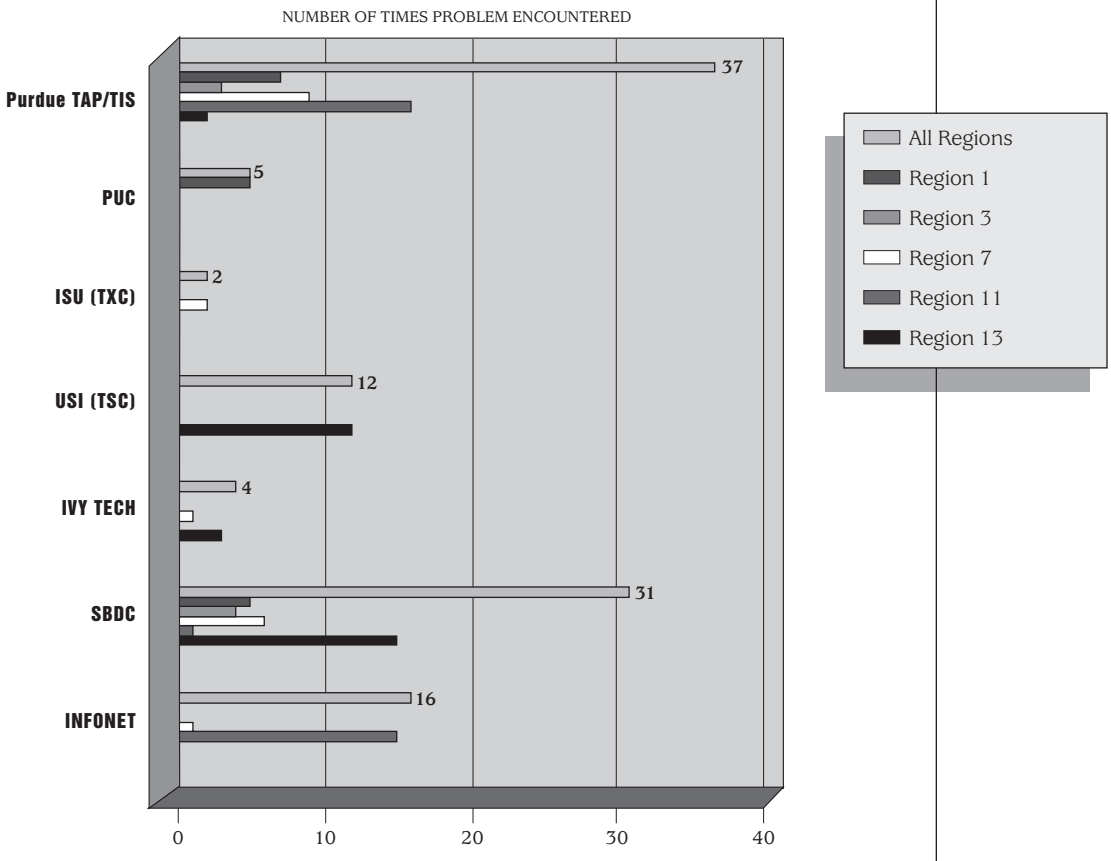
Region 11

Region 13

CLIENT ACTION 1991—CLIENTS RETURNING FOR ADDITIONAL SERVICE



KEY PUBLIC SECTOR RESOURCES USED—JANUARY THROUGH JUNE 1991



Source: Indiana Business Modernization and Technology Corporation, Indianapolis, IN.

- materials management
- product design or engineering
- personnel
- facilities
- management information systems
- environmental/safety

Companies identified by the field engineers are coded for confidentiality, and proprietary information is filed in the regional office. The results of the activity in all 14 regions of the state are reported monthly via modem. Field engineers meet monthly to discuss detailed manufacturing activities. The database is available to all regions for historical activities and planning purposes.

BMT recently enhanced its database to track not only historic quantitative data, but also the results of assistance and qualitative data—for example, jobs saved/added, net income improvement, increased sales, new investment and client feedback.

Figure 5 presents sample analyses based on BMT's historical program data. These analyses indicate trends by region—for example, Region 7 staff have trouble following up after initial meetings, operations is the most common problem area in most every region; and by sector—for example, manufacturing efforts were dominated by the plastics, automotive, medical devices and electronics sectors. As noted earlier, BMT is now creating a plastics center and plastics injection molding networks. Feedback database analysis contributed to this targeted approach.

Strengths

Historical program data directly reflects program experiences regarding firm needs and their receptivity to, and use of, services.

Weaknesses

1. It can be difficult to describe problems and assistance provided systematically for compilation at the end of a pilot program. Field staff activity may, for example, be recorded in narrative form and the content later analyzed to create categories of manufacturer needs. Alternatively, needs categories can be set up initially and modified over time to encompass miscellaneous activities.

2. Field staff must be able to accurately present actual needs of manufacturers in the service area. If field staff are "hammers looking for nails," the needs

they describe will more likely reflect their skills and expertise than the actual needs of the manufacturers.

About the case example:

For More Information

1. Indiana Business Modernization and Technology Corporation. "Manufacturing Technology Service: Pilot to Program." Indianapolis. June 1991.

Robert B. Bassler
Indiana BMT Corporation
One North Capitol, Suite 925
Indianapolis, IN 46204
317-635-3058

REGIONAL NEEDS ASSESSMENTS FOR DEFENSE CONVERSION

To date, few programs have allocated significant resources to identifying the special needs of defense-dependent firms. Defense conversion thus provides a good case study on how needs assessments might be conducted for a targeted industry group. At the strategic level, the primary need is to diversify products or make a transition to or enter commercial markets. This need involves all business facets, including marketing and sales, product development, production management and quality.

Regional needs assessments of the manufacturing population address questions such as "What is a defense-dependent firm?" "How many are there?" "What industry sectors do they dominate?" "Where are they located?"

Data Sources

Defense-dependent firms make shipments to agencies or facilities of the U.S. Department of Defense, agencies or facilities of the U.S. Department of Energy, and prime contractors or subcontractors to these agencies or facilities. Defense-dependent manufacturers can be divided into large prime contractors and various levels of subcontractors. Some subcontractors may also be prime contractors.

The Federal Procurement Data System is the main source of public information about defense-dependent manufacturers. It lists all awards over $25,000 by state and ZIP code. This list contains much duplication because companies are listed by contract.

Most awards, however, are for less than $25,000. These smaller awardees can be identified by requesting subcontractor bidder lists from the major prime contractors in the service area. Although this approach omits contractors from outside the service area, it can be helpful because subcontractors sometimes cluster geographically around a prime. Bidder lists are not always up to date due to time lags in removing inactive subcontractors and adding new contractors.

One difficulty in doing defense conversion assessments is that the federal government uses the Federal Supply Classification (FSC) to categorize firms by types of *products* rather than by types of *industry* (that is, by SICs). The FSC is very broad and not well-defined. Matching contractors with manufacturers directories, or other sources that use SICs, can help address this problem.

Once defense contractor information is matched with SICs, analysts can determine via geographic breakdown the extent to which the major industries in the service area are defense-dependent.

Surveys

Surveys are another approach to determining the extent of defense-dependency in a service area, as well as ascertaining manufacturing respondents' opinions of their need to move into commercial markets.

The target population to be surveyed depends on the survey's specific objectives; this population could be:

- all manufacturers in the service area
- those in industries most adversely affected by defense cutbacks
- prime contractors, because there is a trickle-down effect when a project is cut
- subcontractors, because they tend to be among the first hit by defense cutbacks
- minority-owned businesses established as "8(a) contractors" since they will not receive the kind of preference the government accords them in commercial markets
- firms in areas with military base closures

The survey might include such questions as the following:

- Approximately what percent of your sales can you attribute to U.S. defense contracts?
- Are you a prime contractor, a subcontractor or both?
- Do you perceive your defense-related business to be growing, shrinking or remaining the same?
- What are your present commercial markets?
- In the past three years, have you taken any steps to increase your non-defense business?

Advisory/User Groups

Advisory/user groups can be helpful in determining needs. Large firms with defense and nondefense work can give ideas to small companies to help them assess their needs. Also, large prime contractors can use their mentor-protégé programs to help assist firms.

For More Information

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   45 Executive Drive
   Plainview, NY 11803
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APPENDIX A. METHODOLOGY

The project team based the two volumes of this *Needs Assessment Guide* primarily on results from a survey of manufacturing assistance programs in the United States. We interviewed representatives from more than a dozen programs by phone. Additionally, we made site visits to four programs; the programs we selected varied by age, sponsorship (federal versus state) and the degree of formality of their assessment approach.

These site visits were critical in obtaining a broad variety of perspectives on the assessment process. During the visits, we interviewed a number of program staff (including information specialists, researchers, field agents and engineers); reviewed various materials (for example, population-level reports, assessment guides and tools, final reports); and observed actual assessments conducted at one or more plants.

The following programs participated in the survey; site visits were conducted at those indicated with an asterisk.

- California Manufacturing Technology Center
- University of California, Manufacturing Extension Program
- Georgia Institute of Technology, Economic Development Institute*
- Illinois Institute of Technology, Manufacturing Productivity Center
- Indiana Business Modernization and Technology Corporation*
- Mid-America Manufacturing Technology Center (Kansas)
- Massachusetts State Department of Commerce
- Industrial Technology Institute, Midwest Manufacturing Technology Center (Michigan)
- Science and Technology Foundation, Northeastern Manufacturing Technology Center (New York)
- Industrial Extension Service, North Carolina State University

- Cleveland Advanced Manufacturing Program, Great Lakes Manufacturing Technology Center (Ohio)*

- Industrial Resource Centers (Manufacturing Resource Center, Southwestern Pennsylvania Industrial Resource Center)

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THE COMMUNITY STRATEGIES GROUP (CSG)

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Originally established at The Aspen Institute in 1985 as the Rural Economic Policy Program, and renamed Community Strategies Group in 2000, CSG strives to have a positive impact on communities by -designing, facilitating and participating in ongoing peer-learning and networking opportunities that enhance the efforts of organizations and practitioners working to achieve more widely shared and lasting prosperity in communities, and that sustain the impact of funders' investment in them. CSG's core business focuses on the fields of community and economic development, civic capacity, family and regional livelihood, and community-based philanthropy. CSG also designs and convenes occasional one-time gatherings of foundation or community practitioners working on issues critical to the collective learning of a larger field. In addition, CSG analyzes and packages guiding lessons and strategies from its various learning initiatives.

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