

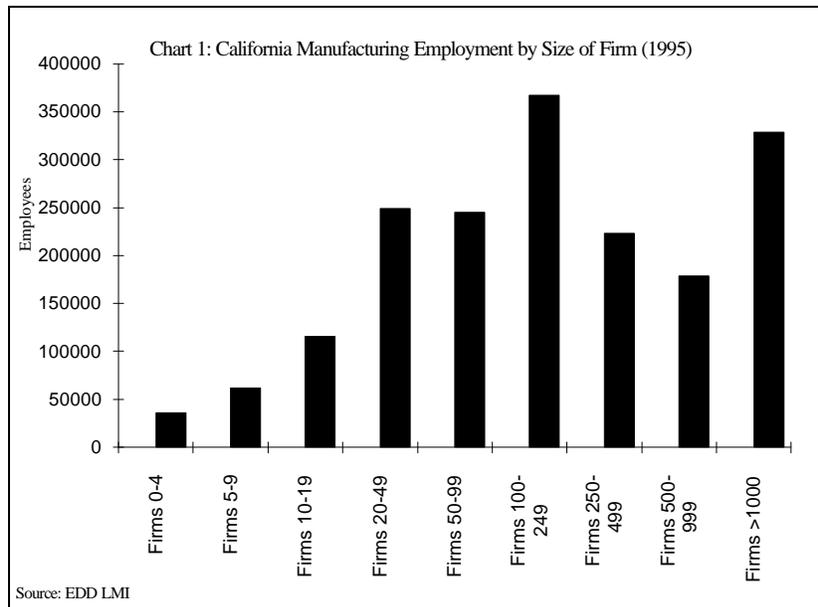
***Meeting The Needs Of Small And Medium Sized Manufacturers
In California***

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Manufacturing Is An Important Part Of California's Economy

- Manufacturing is an important part of California's economy, accounting for 41 percent of the state's economic base in 1995.¹
- California manufacturers added almost 80,000 new jobs over the year. In contrast, national factory employment was down by more than 140,000 jobs.
- High tech manufacturing is one of the four sectors (the others are foreign trade, professional services, and tourism and entertainment) that are driving the state's economy forward.
- The state's top four exporting industries from 1990 to 1995--electrical equipment, computers, industrial equipment, transportation equipment and instruments--produced manufactured goods.
- Small manufacturers are an important part of the electronics, multimedia and other emergent regional industrial clusters.

¹ Manufacturing includes: high tech manufacturing (computers, communications equipment, electronic components, high tech instruments), diversified manufacturing (apparel, publishing, metal products chemicals, plastics non high technology), and aircraft/space/defense (aircraft, shipbuilding, missiles/space, search and navigation equipment). "Economic base" refers to those industries that make a substantial portion of their sales outside of the state. They produce both goods and services. Growth in jobs depends on growth in the economic base. See: "California Economic Growth," Center for the Continuing Study of the California Economy, 1995, p.2-4.



- Manufacturing firms with less than 500 employees employed 1,298,010 workers or 72 percent of the state's manufacturing workforce in 1995.

Manufacturing Firm And Employment Growth

Performance During The 1990-1994 Recession

Data on how California manufacturing firms with fewer than 100 workers performed during the late 1980s and the recent recession shows that they play a very important role in California's economy:

- Manufacturers with less than 100 employees grew more new jobs in the late 1980s, and retained and developed more new jobs during the 1990-1994 recession, than larger firms (Table 1);
- While the overall number of firms declined, firms with less than 100 employees survived better than larger firms.
- From 1987 to 1992, California's manufacturing firms with fewer than 100 employees out-performed every other sector, including the service sector, in relative employment growth.

- From 1991 to 1994, manufacturing firms with fewer than 20 employees lost about 5,400 jobs (2.3 percent), firms with 20-99 employees lost about 8,500 jobs (1.7 percent), and firms with 100+ lost significantly more, 200,400 jobs (15.3 percent).

	Manufacturing 1-19 Employees	Manufacturing 100+ Employees	Trade 1-19 Emp.	Trade 100+ Emp.	Services 1-19 Emp.	Services 100+
California	16.0%	-4.7%	7.3%	3.5%	14.8%	2.7%
U.S. Average	13.4%	-3.4%	5.2%	2.5%	13.8%	4.7%

Source: "Who's Creating Jobs," Cognetics, 1993, p. 38.

Manufacturing Strategy: Meeting Domestic And Global Competition

Manufacturing Employment and Wage Competitiveness Issues for California and the U.S.:

- Over the past 15 years, manufacturing employment as a share of overall U.S. employment has been declining.
- Production worker wages have not kept up with technical workers wages nor with increases in productivity (see Appendix charts).

These Changes are Related to Global and Domestic Competition. Bluestone has summarized a diverse literature and identified the following:

- *Technological Changes, 7% to 25%:* modest increases in US manufacturing productivity due to the introduction of technology has reduced the number of production worker jobs while the need for better educated workers has increased. The continuing global diffusion of technology will increase this effect.
- *Deindustrialization, 25% to 33%:* Shift of job growth from goods production to services sector.

- *Deunionization, 20%.*
- *Trade and immigration: 15% to 20%:* production workers are competing with third-world workers for wages but “knowledge workers” who are in short supply are not. The immigration of larger number of people with limited skills increases the competition for basic skilled production jobs.
- *Trade deficit related to importation of manufactured goods 14%:* Lower cost products produced by low pay global workers depresses wages in the U.S.. For example, third world workers in the mid 1980s were almost as productive in electronics as U.S. workers (63 percent to 83 percent as much) but their wages were only 15 percent to 24 percent as much as those of their U.S. worker counterparts.

Lawrence asserts that from 1979 to 1991, international trade accounted for 29 percent of the decline in U.S. manufacturing employment, while increases in U.S. manufacturing productivity (except services productivity, which did not increase much) accounted for 71 percent.

California Manufacturer’s Strategy (1982-1991)

Business Strategy involves the reinvention of the product development (direct customer involvement) and production process by choosing a different set of activities (including networking with suppliers, competitors and customers) to deliver a unique product at the right price.

Based on the U.S. Department of Labor’s Survey of Manufacturers (published every five years), California manufacturing firms generally followed the following strategy from 1982 through 1991 (see Attachment 1):

- Reduced or held steady the number, pay, and benefits of full-time production workers;
- Rewarded executives and knowledge workers at an increased rate when compared to production workers;
- Reengineered programs and processes;
- In some industries, increased the number of contingent workers (who often do not receive benefits);
- Increased the number and pay of younger “knowledge” workers while laying off older knowledge workers, mid-level managers and supervisors;

- Relied on former capital investments, increased computer technology and management improvements to increase productivity; and
- Took an increased portion of productivity improvements as profits.

Key Factors Limiting The Ability Of Small And Medium Sized Manufacturers To Form Competitive Strategies

For the remainder of the paper “small and medium sized manufacturers” refers to firms with fewer than 500 employees. For this group:

- Capital has not been readily available but may be improving for companies with a good credit evaluation. However, the disappearance of small banks and of bank branches in some communities may negatively impact availability.
- Adoption of new technology is slow and costly;
- Limited opportunities for computer and business networking;
- Prime contractor are requiring small contractors to greater levels of risk than in the past;
- Lack of skilled workers who require on the job training;
- Low levels of workforce training;
- Labor/management relationships are often contentious;
- Compliance with regulations and tort litigation is costly;
- California’s manufacturers’ corporate taxes are not competitive with other states; and
- Self destructive intra-industry competition occurs between low-productivity and high productivity firms. The former make it difficult to earn the profits to modernize.

From the perspective of California employment, wages and ultimately profits, a small and medium sized manufacturing firm strategy that seeks only to cut wages and improve productivity is not sufficient under current global and domestic competitive conditions. New markets and new niches must be found at a rate that keeps up with or out paces productivity improvements to increase employment and wages. Low

wage producers of mass products can always--particularly if they adopt new technology--produce goods cheaper in lower wage countries.

Pacific Rim Competition Is Vying For Higher Valued Added Niches

Pacific Rim countries explicitly recognize the importance of small and medium sized manufacturers to their economic development. Key policies designed to speed their growth include:

- Encouraging development of cross-national supplier contracting;
- Adopting of new organizational forms such as networks, strategic alliances, and cross-national joint ventures that allow small firms to gain some of the advantages which are available to large multinationals.
- Providing access and capital for purchasing improved production technologies;
- Adopting of ISO 9000 and other international production standards;
- Establishing “best practices” programs in areas such as technology, finance, and training;
- Facilitating exports, including the adoption of “best practices” from other exporting countries in the region; and
- Actively identifying and supporting or opposing international trade and other policies that might help or harm small domestic manufacturers.

Government Assistance Programs

State	Number of Manufacturers	Federal NIST Center Funding (mill.)	NIST Funding/per Manufacturer	State Funding/per Manufacturer	Line Item in State Budget?
California	53,000	\$4.0	\$75	\$36	Yes
New York	30,000	21.7	723	150	Yes
Texas	20,000	12.8	640	150	Yes
Penn.	18,000	10.5	583	458	Yes
Ohio	17,500	12.4	708	212	Yes
Florida	15,600	3.4	217	186	No
Mass.	11,000	11.4	1,036	181	Yes
North Carolina	11,000	1.5	136	100	No
Minnesota	7,112	9.9	1,392	773	Yes

Source: Adapted from California Manufacturing Technology Center, 1996

- California is not getting its fair share of federal funding: the state has 29% of the comparison state's manufacturing but receives only 5% of the NIST funding.
- California receives the lowest level of NIST funding per manufacturer of any of these comparison states.
- California is last in the level of funding per manufacturer; North Carolina expends three time as much.

Options For A Domestic And Globally Competitive Strategy

The following options could improve the ability of California's small and medium sized manufacturers to formulate and implement competitive strategies.

- Increase the rate of innovation, technology transfer, and use of computerized design/manufacturing techniques;

- Adopt product design for easy manufacturing by using advanced technology and by involving design and production staff in the product design process;
- Continuously train workers;
- Adopt Total Quality Management and other international managerial and production quality standards that customers want and expect;
- Develop labor/management relationships that allow the rapid adoption of new work organization strategies (e.g. production workers as “knowledge workers”) and that empower workers by involving them in major corporate decisions;
- Provide a reasonable level of compensation linked to productivity improvements; and
- Develop or participate in a sophisticated domestic or international inventory control, warehousing, and product distribution system.
- Develop and participate in the formation of flexible business networks that:
 - * Collaboratively reduce the risk and cost of productivity improvements and training;
 - * Extend across international borders to create new products and market relationships;
 - * Stabilize or reduce excess capacity through multiple joint manufacturing contracts; and
 - * Improve competitiveness of high-productivity shops so that they can successfully compete with low- and lean-performance shops.
- Implement computer-based communications, manufacturing networks, and other information-processing systems that leap-frog those of competing nations;
- Develop effective local, U.S., and global marketing and sales strategies including joint ventures and other forms of affiliation with foreign and international corporations;
- Reduce duplicative regulations and the cost of compliance;
- Examine what would be necessary to make California’s manufacturers’ corporate taxes more competitive with other states;

- Actively pursue tort reform; and
- Obtain access to timely and adequate levels of capital.

Government Programs Can Help Increase Competitiveness

Manufacturing Improvement Services:

- Federal Reserve Bank San Francisco Weekly Letter: “[I]t appears that if a state development agency increased its annual expenditures per worker by \$10.00 over the current mean of \$10.67 [in contrast California spent almost \$5 per worker in 1993], in other words, roughly doubling state development expenditures, then manufacturing jobs in that locality would increase by 1 1/6 percent per year.”
- U.S. General Accounting Office (GAO) 1995 the national survey of 766 manufacturers who had received NIST manufacturing improvement services: “[M]ost respondents reported that the assistance had positively affected their use of technology in the workplace, the quality of their product, and the productivity of their workers. Between 44 percent and 63 percent of respondents reported that [Manufacturing Excellence Program] assistance had positively affected certain specific indicators of their business performance, such as their customer satisfaction, their profits, and their ability to meet production schedules.
- Dunn and Bradstreet 1994 survey of 750 small and medium sized manufacturers who had received NIST manufacturing improvement services (MEP): “[small and medium sized manufacturers] served by MEP centers are up to *six times more likely* to organize specific improvement actions than small- and medium-sized manufacturers of similar size, type of operation and unit volumes not assisted by a center.”
- According to NIST, the seven Manufacturing Technology Centers (MTC) founded between 1989 and 1992 provided 12,350 services, including 2,885 technical assistance projects, to over 10,000 small and medium sized manufacturers. Firms that provided evaluation data said that they expected each technical assistance project “on average” to result in:
 - ⇒ \$191,473 in increased sales;
 - ⇒ \$17,518 in reduced inventory;
 - ⇒ \$23,776 in savings from labor and material costs; and
 - ⇒ five jobs created or preserved.
 - ⇒ Manufacturing firms reported total economic benefits of almost \$7 for every federal dollar that the centers received.

- In 1996 the Battelle Memorial Institute completed a cost-benefit study of Ohio's Edison Technology Centers and estimated that the Centers generated a direct economic impact for Ohio of more than \$730 million from 1992 to 1995. Applying an economic multiplier, the total impact on the state's domestic product was \$1.27 billion. State funding over the three year period was about \$70 million. An estimated 5,600 jobs were created or retained, resulting in \$169 million in personal income. Company sales were increased by \$110 million.

Workforce Training

- Bartik writes that:

...when the job training is tied to a firm's efforts to upgrade its technology, government grants for customized job training can be effective in improving productivity. In their study of a Michigan grant program for technology-related training, Harry J. Holzer and his colleagues found that product scrapage rates went down significantly more in assisted firms than in comparable unassisted firms--enough so that the program's economic benefits exceeded the costs of the training grants.

- A 1995 study by Maani, Putterill, and Sluti found that:

The study has been able to show empirically that in manufacturing companies, improving quality [TQM and other quality training] positively enhances operational performance and productivity, and certain indicators of business performance. The association is most pronounced between quality and process utilization, with the second largest impact of quality being on manufacturing costs.

Public Infrastructure Improvement and Manufacturing

A 1996 study by Turner shows that public infrastructure improvements strongly affect private sector productivity and are a strong inducer of private investment and increased net employment in metropolitan areas, and contribute significantly to manufacturing efficiency and productivity.

Business Assistance

A fifty state study found that state small business programs which included provision of venture capital, development credit corporations, and product development corporations "...increased the annual number of incorporations and decreased the annual number of bankruptcies."

Export Assistance

The literature reports mixed findings for the effectiveness of state export assistance programs:

- Two studies of state export assistance programs show negative results; those state efforts did not result in improved exports.
- A third study found that state promotion of manufacturing-related exports did not significantly increase employment in this sector.
- However, a fourth study found a link between state export promotion activity and state exports. For every \$1,000 increase in state export promotion expenditures, there was a \$432,00 increase in state manufactured exports.

California Manufacturing Competitiveness Resources

There are at least 15 separate state and federal government agencies that engage in policy development for, or identify themselves as offering some portion of their services to, small and medium sized manufacturers.

- *California Economic Policy Setting*: Economic Strategy Panel
- *California Technology Policy Setting*: Council on Science and Technology;
- *California Collaborative Manufacturing Improvement Services System*: Office of Strategic Technology, Trade and Commerce Agency
- *California Regional Manufacturing Competitiveness Programs*
 - * *Capacity building and networking*: TeamCalifornia, Trade and Commerce Agency
 - * *Regional Needs Assessment and Evaluation*: Los Angeles Regional Technology Alliance, Bay Area Regional Technology Alliance and regional economic development organizations like San Diego Association of Governments, Joint Venture:Silicon Valley, and manufacturing' associations (California Small Manufacturers Association, California Manufacturers Association, etc.)
 - * *Formation of Networks*: Small Manufacturers Institute

- * *Industry Cluster Training and Networking*: CALSTART and CalSIP (terminated and is a good model).
- * *Manufacturing Process Improvement Services*: NIST's three Manufacturing Technology Centers.
- * *Training and Manufacturing Process Improvement Services*: Eight Centers for Applied Competitive Technologies, California Community Colleges.
- * *Employee Training*: Employment Development Department, Employment Training Program, Job Training Partnership Act, One-Stop Career System, California Manufacturing Association training, etc.
- * *Training in Business Development and International Trade*: Community College Economic Development Program, and Trade and Commerce International Trade and Investment Division, Small Business Development Centers.
- * *Research Collaboration and Technology Transfer*
 - ⇒ University of California: In 1993, the University of California had 90 research centers, laboratories, and programs, other than its business and engineering schools, involved in some way with manufacturing. For example, UC Microelectronics Innovation and Computer Research Opportunities Program; Biotechnology STAR Project; and UC San Diego Connect.
 - ⇒ National Laboratories (Lawrence Livermore, Lawrence Berkeley, Jet Propulsion Laboratory, etc.)
 - ⇒ California State University:
 - ◇ 20 schools or colleges of business administration and/or management;
 - ◇ 13 schools of engineering or computer science, some with specializations such as apparel manufacturing;
 - ◇ More than 104 certificate granting programs related to manufacturing; and
 - ◇ 29 outreach centers and institutes such as the Automated Manufacturing Systems Evaluation and Implementation Laboratory at CSU Long Beach.

Issues Related To The Current Distribution And Allocation Of California's State Manufacturing Competitiveness Resources

- * Need to articulate a state vision unifying and directing services for small and medium sized manufacturers toward an overall competitiveness goal;
- * Need to consider an integrated strategy for prioritizing and organizing resources to effectively assist in competing in domestic and global markets;
- * Need to coordinate services between state agencies, across levels of government, and between the state's higher education systems; current services tend to be piecemeal, disjointed, and limited by interagency competition and narrow agendas;
- * Competition and conflicts over funds and match between the Centers for Applied Competitive Technologies and Manufacturing Technology Centers has hindered development of a statewide manufacturing improvement program;
- * Need to compete effectively for a fair share of federal manufacturing improvement funds; and
- * Need to develop and implement performance measures or bench marks that can be consistently used to evaluate program effectiveness to establish budget priorities.

Estimated Cost To Fund A Manufacturing Improvement Services Program For California

There are at least 3 methods to estimate the full cost of funding a California manufacturing improvement program. The estimates vary from a low of \$45.4 million, to \$50 million, to a high of \$83.9 million per year.

Federal/State Parity

Based on Table 2 data, the federal government spent an average of \$548 per manufacturer in 1995, and comparison states spent an average of \$249. California currently has about 57,000 manufacturers with fewer than 500 employees. The appropriate level of manufacturing improvement services funding for California, using the above averages, would be: \$31.2 million in federal funds and \$14.2 million in state funds, totaling \$45.4 million per year.

Provision Of Services To Firms That Are Likely To Benefit

Firms with less than 19 employees may not benefit as much from manufacturing improvement services as larger firms. A CRB study estimates that approximately 10 percent of California's 18,728 small and medium sized manufacturers (20 to 500 employees) have already adopted competitive practices. An additional 10 percent might not be interested in receiving the services for various reasons. This leaves an estimated 14,984 firms that could benefit from manufacturing improvement services. The rate at which new technology and workforce practices are introduced and adopted varies by industry, but assume that significant competitive advances are made for firms every 5 years. About 20 percent or 2,997 firms, would require manufacturing services on a yearly basis to maintain an appropriate modernization schedule. Assuming an average cost of \$28,000 per client² for assessment and six days of professional field service per firm, it could cost as much as \$83.9 million per year to serve 20 percent of California's manufacturing firm's needs in one year, or a total of \$428 million for a five years period.

Funding Based On Number Of Manufacturing Jobs

Daniel Luria and associates, in a 1994 article, "Fixing the Manufacturing Base: the Allocation of Manufacturing Extension", proposes a geographic model for allocating manufacturing improvement services. Luria suggests that the appropriate service region size for a manufacturing improvement center should be roughly a circle with a 50 mile radius, or no larger than a field staff member could reach in about an hour. Center funding would be about \$1 million per 35,000 manufacturing jobs in this service area. Applying these estimates to California, about \$50 million would be needed to fully fund a statewide manufacturing improvement program. This figure is close to the \$45.4 million estimate using the federal/state parity method above, but substantially less than the \$83.9 million estimate based on providing a full range of manufacturing services.

Potential Benefits From Investing In Manufacturing Improvement Services

Applying the estimated benefits identified in the program evaluation literature, a state and federal government yearly investment of \$50 million could result in:

- 15,000 to 21,000 new jobs (5 to 7 per firm);
- \$572 million in increased sales (based on an average increase in sales of \$191,000); and
- \$350 million in overall benefits (\$7 dollar return on every dollar invested).

² Cost are based on a 1985 estimate made by Shapira and adjusted for inflation to 1995.

ATTACHMENT

SELECTED MANUFACTURING ACTIVITY, 1982-1991

