

North Dakota Manufacturers: Attributes and Technical Assistance Needs

F. Larry Leistritz

Professor

Department of Agricultural Economics

Janet K. Wanzek

Research Assistant

Department of Agricultural Economics

The 1980s was a period of turmoil in the U.S. manufacturing sector, and particularly in rural manufacturing (Kale and Lonsdale, 1987; Ahlbrandt, 1988). Increased foreign competition, outmoded facilities, and lack of responsiveness to changing technologies are among the factors that have eroded the competitiveness of U.S. companies in many industries (Eisinger, 1991).

As a result of these and related forces, substantial restructuring has occurred in many industries, leading many large companies to close some plants and to reduce the scale of operation in others. Restructuring has also included decentralization in many industries, with some firms increasing their reliance on out-sourcing for components as an alternative to in-house production while others sought to establish branch plants in locations where a favorable combination of production and distribution costs could be attained.

The restructuring of the manufacturing sector and the resulting changes in rural manufacturing operations have led to a reexamination of the role of manufacturing in rural economic development (Pulver, 1989; Leistritz, 1991). At the same time, many states responded to these changes by attempting to take a more active role in assisting their manufacturing sectors through various programs of technical and/or financial assistance (Chapman et al., 1990; Eisinger, 1991; Shapira, 1990).

In North Dakota, as in many rural states, the last decade has been an economically difficult time, and economic diversification has become a high priority for state policy makers. The manufacturing sector has been targeted to play a major role in the state's future economic development. The new economic development initiative, titled **Growing North Dakota**, identified expansion of manufacturing employment as a major goal and contained a number of provisions that enable state entities to assist the manufacturing sector (e.g., financing at favorable terms and assisting technology commercialization or transfer). For state assistance to be most effective, however, decision makers must understand the composition of the manufacturing sector and the needs of its firms.

The purpose of this study was to develop a better understanding of the firms that comprise the North Dakota manufacturing sector and their needs. Specific objectives were to (1) describe the firms that make up the manufacturing sector in terms of such characteristics as their products, location, employment, suppliers, and related attributes, and (2) identify their needs for financing and technical assistance. While the study focused on firms located in North Dakota, the findings also may be applicable to other states, particularly to those that are not dominated by large metropolitan centers and that have traditionally relied on agriculture and other resource-based industries as their economic mainstays.

Procedures

Information needed to fulfill the project objectives was obtained through a statewide survey of North Dakota manufacturers, conducted during May-July, 1991. A total of 214 usable responses was obtained, representing 58 percent of the manufacturers that served markets outside their local area.

Results

The results of the survey are summarized in the following sections that deal with (1) general characteristics, (2) sales and marketing, (3) expenditures and suppliers, (4) employment, (5) financing, and (6) future plans and needs for technical assistance.

General Characteristics

Most of the respondents (79 percent) reported that their establishment was the only location of their firm, while 13 percent indicated that it was the headquarters, and 8 percent said it was a branch or regional office (Table 1). The firms varied greatly with regard to the length

Table 1. Selected characteristics of respondents manufacturing facilities, 1991.

Characteristic	All Firms
Type of establishment	
Only location of firm	79.0
Headquarters of firm	13.1
Branch or regional office	7.9
Year firm started in this community	
1980 and after	43.8
1970-1979	25.4
1950-1969	18.4
1920-1949	6.9
Before 1920	5.5
Type of product	
Durable goods	66.0
Nondurable goods	34.0
High-tech firms	10.9
Agribusiness firms	24.2
New firms since 1987	18.5
Firms established prior to 1987	
Fewer than 20 employees in 1987	59.5
20 employees or more in 1987	22.0

of time they had been operating in the community. About 44 percent had started in 1980 or after.

Of the responding firms, 66 percent were engaged in durable goods manufacturing (Table 1). Firms in the Standard Industrial Classification (SIC) categories that have been designated as high-tech (Smith and Barkley, 1988) accounted for about 11 percent of the respondents. Agribusiness firms made up about 24 percent of the sample; these firms were about equally divided between nondurable goods manufacturers (primarily food processors) and durable goods manufacturers (primarily farm equipment producers).

Firms that had been established since 1987 accounted for about 18.5 percent of the responding firms, established firms with fewer than 20 employees for 59.5 percent, and established firms with more than 20 employees for 22 percent. About 50 percent of the responding firms were located in the state's three Metropolitan Statistical Areas (MSAs), while the remaining 50 percent were located in the state's nonmetropolitan counties.

Sales and Marketing

The responding firms reported that gross sales for 1990 averaged \$9.2 million (Table 2). Firms located in the metropolitan counties had a substantially higher level of gross sales in 1990 than their nonmetropolitan counterparts. As a group, the agribusiness firms had the highest level of gross sales in 1990, an average of \$32.6 million per firm. Nondurable goods manufacturers had a much higher average sales level than durable goods manufacturers, although median values differed substantially less.

When the firms compared their 1990 gross sales with those for 1989, the typical (median) firm reported an increase of 10 percent. About 15 percent of the respondents reported a negative change in sales while 22 percent indicated that their sales had not changed. Nondurable manufacturers recorded substantially less growth in gross sales from 1989 to 1990 than the other firm types compared (data not shown in table).

Table 2. Gross sales of respondent manufacturing facilities.

Gross Sales	All Firms
Gross sales in 1990	
Mean	\$9,160,922
Median	642,500
Distribution:	
Less than \$100,000	15.6%
\$100,000 to 249,999	16.6
\$250,000 to 499,999	12.2
\$500,000 to 999,999	12.3
\$1,000,000 to 4,999,999	26.6
\$5,000,000 to 9,999,999	7.3
\$10,000,000 to 49,999,999	5.5
\$50,000,000 or more	3.9
Change in gross sales, 1990 compared to 1989	
Mean	18.3%
Median	10.0
Projected change in gross sales, 1991 compared to 1990	
Mean	17.9%
Median	6.4

When projecting their gross sales for 1991, the firms expected their 1991 gross sales to exceed the 1990 level by an average of 18 percent; the median value was 6.4 percent (Table 2). One-third of the firms expected either no growth in sales or a decrease from 1990 to 1991. Among the firm types, the nondurable goods manufacturers projected a substantially lower sales growth, on average, from 1990 to 1991 than firms of other types (data not shown in table).

The respondents sold about 37 percent of their products within the local area, 21 percent within the rest of North Dakota, 37 percent elsewhere in the United States, and about 5 percent outside the United States. About 10 percent of the firms reported that essentially all of their products were marketed locally; some of these may be supplying other firms that serve a wider market. At the other extreme, 26 percent reported that none of their products were marketed locally. Only about one-fourth of the firms reported selling products outside the United States, but about half planned to serve international markets in the next five years.

The average firm sold about 42 percent of its products outside the state; the median value was 30 percent. About 23 percent of the firms sold none of their products outside the state, while about 43 percent sold more than half of their products outside the state. Agribusiness firms and high-tech establishments had relatively high percentages of out-of-state sales. Nonmetropolitan firms had a somewhat higher level of out-of-state sales than their metropolitan counterparts.

Expenditures and Suppliers

The manufacturers also were asked about their expenditures by category and by the location of the supplier. Mean values for each category of expenditure and the geographic distribution of the various categories of expenditures are shown in Table 3. The firms generally reported that their labor expenditures were concentrated in the county where the firm is located. Expenditures for processed materials and raw materials, on the other hand, were more likely to go to out-of-state suppliers. Overall, the responding firms reported that about 58 percent of their total expenditures were to in-state entities.

Employment

The manufacturers responding to the survey employed an average of 54 workers at the time of the survey (Table 4). A few large firms influenced the average substantially, however; the median value was 15 workers. The firms had increased their employment substantially over the last five years; the average number of workers employed by the firms five years previously was 36. The firms also anticipated substantial employment growth over the next five years. The average firm expected to have about 79 employees in five years; the median value was 26.

Operators and fabricators were the largest occupational category among the current employees of the North Dakota manufacturers, accounting for 34 percent of total employment (Table 4). The next largest groups were laborers (20.2

Table 3. Distribution of expenditures by respondent firms, 1990.

Expenditure Category	Percent of Total Expenditures	Location of Supplier			
		Within County	Rest of State	Rest of U.S.	Outside U.S.
Raw materials	30.3	20.8	22.5	52.8	3.9
Processed materials	21.9	16.5	17.7	62.6	3.2
Labor	27.4	88.3	9.5	2.2	0.0
Subcontracting	4.7	51.5	23.1	24.3	1.1
Other	15.7	62.5	16.8	20.2	0.5

percent) and precision production, craft and repair workers (17.2 percent). Among the occupational groups, laborers had experienced the most rapid growth over the past five years (84.7 percent) followed by sales representatives and precision production, craft and repair workers (Table 4). Over the next five years, the most rapid growth was anticipated for sales representatives (95.8 percent) followed by operators and fabricators (59.5 percent). Overall, the average firm employed 36 people five years ago, employs 54 today, and expects to employ 79 in five years.

The respondents reported the greatest degree of difficulty in locally recruiting sales representatives and employees in professional specialties. The greatest difficulty in retaining employees was reported for sales representatives. Nonmetropolitan firms reported relatively greater difficulty in recruiting and retaining employees in the categories of *executive, administrative, or managerial* and *professional specialty*, compared to their metropolitan counterparts.

The survey also provides insights concerning the types of jobs that the manufacturing sector may provide in the next five years. Operators and fabricators are expected to make up 44 percent of the new jobs created in the manufacturing sector; precision production, craft, and repair workers would constitute about 15 percent; and laborers almost 14 percent (Table 4).

The survey data also provide insight regarding an important policy issue – the potential of different types of firms to

create jobs. The net changes in numbers of workers employed by firms of different types are summarized in Table 5. Overall, the firms in the survey had an average net employment change of about 17 jobs, compared to the situation five years previously; the median value was four. About 13 percent of the firms had a negative employment change over the five-year period while 11 percent reported no change in the total number of workers employed. When nondurable and durable manufacturers are compared, the nondurable firms created about 7.6 more jobs, on average, than their durable counterparts.

The role of new and small firms in job creation is also addressed in Table 5. Firms that had begun operations within the last five years created an average of about 35 jobs per firm and accounted for 24 percent of the total jobs created by the survey respondents. Established firms with fewer than 20 employees five years before the survey created an average of 5.6 jobs per firm and accounted for about 19 percent of the total jobs created by all firms. Established firms with more than 20 employees five years previously created almost 38 jobs per firm and accounted for almost 57 percent of the total jobs created.

Agribusiness firms, on average, created almost four times as many jobs per firm as the other firms in the survey (Table 5). A few firms that recorded large employment gains influenced the average substantially, however, as the median values for agribusiness firms and the other firms were 5.0 and 4.5, respectively.

Table 4. Current, past, and projected employment by occupational category for North Dakota manufacturers, 1991.

Occupational Category	Average Number of Employees Per Firm			Projected Employment Growth in Five Years	
	Current	Five Years Ago	Five Years From Now	Number	Percent
Executive, administrative, and managerial	4.8	3.6	6.3	1.5	6.0
Professional specialty	3.6	2.5	5.2	1.6	6.4
Sales representatives	2.4	1.4	4.7	2.3	9.2
Clerical workers	4.3	3.1	5.6	1.3	5.2
Precision production, craft, and repair	9.3	5.6	13.1	3.8	15.2
Operators and fabricators	18.5	13.7	29.5	11.0	44.0
Laborers	10.9	5.9	14.3	3.4	13.6
Other	0.3	0.2	0.4	0.1	0.4
Total Average Per Firm	54.1	36.0	79.1	25.0	100.0

Financing

The manufacturers were asked about activities they had undertaken in the last 12 months to obtain financing. Almost half (47.8 percent) of the respondents attempted to secure a loan for working capital, and 40 percent sought financing for new equipment (Table 6). Loans for the other purposes ranged from 14 to 30 percent of the respondents.

Overall, about 35 percent of the respondents had not sought financing in the last 12 months. The remainder had attempted to obtain one or more loans; of those, about 32 percent reported that

they had encountered difficulty in obtaining financing (Table 6). Durable goods manufacturers reported such difficulties more frequently (37 percent) than their counterparts (24 percent). New firms (established within the last five years) reported financing difficulties more frequently (53 percent) than their established counterparts, and agribusiness firms reported problems more often (48 percent) than others.

The companies seeking financing contacted an average of 1.5 financial institutions. About 68 percent contacted only one institution, 21 percent contacted

two, about 8.5 percent contacted three, and only 2.3 percent contacted four (Table 6). New firms contacted more financial institutions (an average of 1.6) than did established firms; among the established firms, those with fewer than 20 employees five years ago contacted more institutions (1.4) than the larger firms, which contacted an average of 1.3 institutions.

The manufacturers also were asked to identify the types of financing sources contacted. Commercial banks were by far the most frequently utilized source of financing. Of 135 firms that sought financing, 113 contacted a commercial bank, 86 submitted a loan application, and 82 received a loan. The Small Business Administration and the Bank of North Dakota were other sources utilized by a number of respondents.

Future Plans and Needs for Technical Assistance

The manufacturers were asked about their plans for business changes within the next two years. Almost 80 percent planned to increase their market share, 76 percent would market existing products to different customers, and 75 percent want to increase their production capacity (Figure 1). About two-thirds of the respondents want to add new products within the next two years. On the other hand, only 7 percent planned to add a new branch or to relocate.

Table 5. Jobs created in the last five years by firms of different types, 1991.

Jobs Created in Last 5 Years	All Firms	New Firms	Established Firms		NonDurable Mfgs	Durable Mfgs	Agribusiness	Other	High-Tech	Other
			Less than 20 Employees	20 or More Employees						
Mean (Number)	17.1	35.4	5.6*	37.8*	22.5	14.9	38.5*	11.4*	23.8	17.0
Median (Number)	4.0	14.0	2.0	13.0	3.0	5.0	5.0	4.5	13.0	4.0
Distribution of jobs:										
	Firm Type									
Fewer jobs	13.1	0.0	14.9	15.9	19.3	10.4	15.4	12.7	5.0	14.5
No change	11.4	5.0	16.8	2.3	12.3	11.3	12.8	11.1	0.0	13.1
1-10	44.0	40.0	51.5	27.3	36.8	46.3	28.2	48.4	40.0	44.1
11-25	20.0	35.0	13.9	27.3	21.1	20.0	28.2	17.5	25.0	19.3
26-50	4.6	5.1	1.0	11.4	3.5	5.2	5.1	4.0	15.0	2.8
51-100	3.4	10.0	2.0	4.5	0.0	5.2	2.6	4.0	10.0	2.8
Over 100	3.4	5.0	0.0	11.4	7.0	1.7	7.7	2.4	5.0	3.4

*Significant difference at .05 using Tukey Test.

Table 6. North Dakota manufacturers' efforts to secure financing in the last 12 months, 1991.

Efforts to Secure Financing	Percent
Total number of loans sought:	
None	35.4
One	23.9
Two	21.5
Three	12.0
Four or more	7.2
Tried to secure a loan for:	
New equipment	40.4
New building	15.9
Working capital	47.8
Overall business operation	30.4
Refinancing old debts	14.4
Number of financial institutions contacted:	
Distribution (mean = 1.5)	
One	68.2
Two	20.9
Three	8.5
Four	2.3
Encountered difficulty in obtaining financing:	
All firms	32.2
Nondurable	24.0
Durable	36.6
New	52.6
Established (<20 employees)	27.1
Established (20/+ employees)	32.3
Agribusiness	48.4
High-tech	31.1
Metropolitan location	33.8
Nonmetropolitan location	30.6

The manufacturers were asked about areas in which they might need worker training and educational assistance. Of the subject areas specified, marketing and sales was the area that was rated as most important by the respondents (Table 7), followed by quality assurance and quality control. Other areas that received relatively high ratings were management training and finance. When ratings of the different areas for training and education were compared among the various types of firms, marketing and sales received the highest rating by all firm types except new firms. For this group, financing was the most important topic, with sales and marketing a close second.

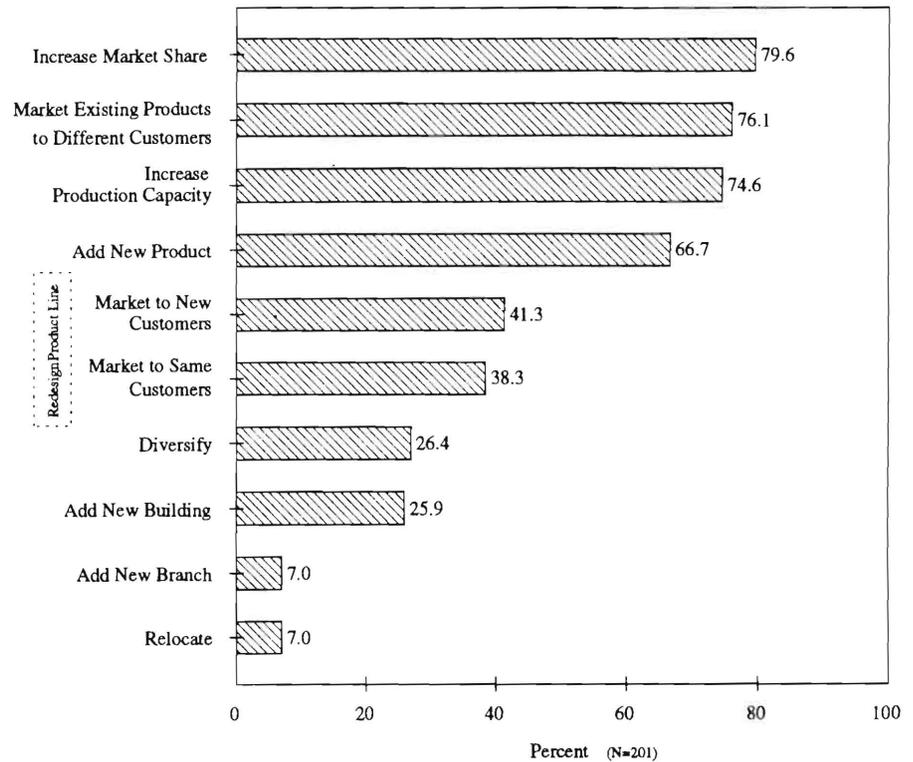


Figure 1. Respondents' plans for business changes in the next two years, 1991.

The manufacturers were also asked in which areas they perceived the greatest need for technical assistance (consulting). The area that received the highest rating was marketing studies (Table 8), followed by quality assurance and process improvement. Marketing studies were also the most highly rated subject area for durable manufacturers, for nondurable goods manufacturers, and for agribusiness firms. New firms indicated the greatest degree of interest in assistance in developing international markets, followed by process improvement. Large established firms (that had 20 or more employees five years previously) placed the highest priority on process improvement, with quality assurance a close second and marketing studies ranking third. High-tech firms gave the highest rating to process improvement and inventory control.

Conclusions and Implications

The manufacturing sector is viewed as being central to many states' efforts to achieve economic development and diversification. This article summarizes results of a study aimed at achieving a better understanding of the firms that make up the manufacturing sector in North Dakota and their needs for support in such areas as financing, worker training, and technical assistance. The data base consisted of information from 214 firms, or roughly 58 percent of the manufacturing firms that serve markets outside their local area.

The results reveal that many North Dakota manufacturing firms are relatively new (almost 44 percent began operations at their present location after 1979) and relatively small (about 57 percent had gross sales of less than \$1 million in 1990). Most of them (77 percent) market some of their product outside the state, and they see marketing skills as critical to their future success.

Table 7. Training and educational assistance needs of North Dakota manufacturers, 1991.

Area of Need	Mean Score*	Percent Rating Area as Critically or Very Important
Operator training	3.36	32.9
Computer-aided design	3.65	24.6
Basic computer skills	3.39	25.7
Computer-aided manufacturing	3.78	23.7
Quality control	3.08	40.0
Management training	3.11	39.4
Marketing and sales	2.66	53.7
Exporting	3.60	28.4
Quality assurance	3.07	40.4
Financing	3.23	37.2
Labor relations	3.41	25.7

*Based on a scale of 1 (critically important) to 5 (not important).

The firms represented in the survey purchased about 58 percent of their inputs (including labor) from suppliers within the state. Almost all of the respondents (98.5 percent) indicated that they would make an effort to purchase more inputs from in-state suppliers if the items were available and prices were comparable. These findings provide support to those of Leistritz (1991) and indicate that establishing a brokerage network to connect manufacturers with in-state suppliers could enhance economic growth and development in the state.

The survey provides insights about the role of various types of firms in job creation. While new firms and small firms did create substantial numbers of jobs, the larger established firms (that had more than 20 employees five years prior to the survey) accounted for almost 57 percent of the total jobs created during the past five years. This finding suggests that state assistance efforts, which are often targeted toward new or relocating firms, should not overlook the state's established companies.

Financing is often mentioned as an area of concern by the state's manufacturers, as well as by representatives of other business sectors. The survey results show that about 65 percent of the respondents had sought financing during the last year and 32 percent of these (or 21 percent of all survey firms) reported that they had difficulty in obtaining financing. Financing problems were reported most frequently by new firms and by agribusiness firms.

These findings suggest that financing is indeed a problem for a substantial number of firms in the manufacturing sector. New public-supported financing programs may ease the capital constraints faced by some of these firms, but policy makers and development practitioners face challenges in determining how to allocate their limited resources.

When the firms were asked about areas in which they need training and educational assistance, marketing and sales received the highest rating. A similar question assessed areas in which firms saw a need for technical assistance (consulting); marketing studies received the

Table 8. Training and educational assistance needs of North Dakota manufacturers, 1991.

Subject Area	Mean Score*	Percent Rating Area as Critically or Very Important
Accounting and records	3.71	20.5
Human resource management	3.69	15.0
Financial analysis/cost control	3.39	30.2
Computer system	3.32	28.0
Inventory control	3.32	32.0
Plant layout and design	3.66	20.6
Production control	3.37	29.6
Research and development	3.38	29.1
Marketing studies	2.92	45.3
Strategic planning design	3.43	28.9
Process improvement	3.20	31.1
Material handling	3.51	23.0
Industrial waste management	3.75	18.4
Prototype testing	3.97	14.5
Product-process development	3.63	18.8
Product and process commercialization	3.78	15.1
Developing international markets	3.47	29.4
Government/manufacturing specification	3.68	23.0
Quality assurance	3.00	38.0

*Based on a scale from 1 (critical) to 5 (not important).

highest rating, followed by quality assurance and process improvement. Market analysis, particularly assistance in developing international markets, may assume an even greater importance in the near future as manufacturers more fully understand the implications of U.S.-Canada Free Trade and North American Free Trade agreements. Clearly, marketing is one of the areas on which future technical assistance efforts should focus.

The survey results also indicate the diversity of technical assistance needs perceived by manufacturing firms. Of the 19 subject areas listed on the survey questionnaire (see Table 8), 14 were rated as critically important or very important by 20 percent or more of the respondents, and five areas were rated as critically or very important by 30 percent or more. Entities that attempt to provide technical assistance to the manufacturing sector likely will need to employ specialists with a wide range of backgrounds and skills or to develop relationships with universities or other organizations to enable them to draw upon personnel with specialized skills on an "as needed" basis.

References

- Ahlbrandt, Roger S., Jr. 1988. "Adjusting to Changes in Traditional Markets: The Problems of Small Manufacturers in Older Industrial Regions." *Economic Development Quarterly* 2(3): 252-264.
- Chapman, Robert E., Marianne K. Clark, and Eric Dobson. 1990. *Technology-Based Economic Development: A Study of State and Federal Technical Extension Services*. NIST Special Publication 786. Washington, D.C.: U.S. Dept. of Commerce.
- Eisinger, Peter. 1991. "The Rise of State Venture Capitalism." *Economic Development Quarterly* 5(1): 64-76.
- Kale, Steven R., and Richard E. Lonsdale. 1987. "Recent Trends in U.S. and Canadian Nonmetropolitan Manufacturing." *Journal of Rural Studies* 3(1): 1-13.
- Leistriz, F. Larry. 1991. "New or Expanding Basic Sector Firms in the Upper Great Plains: Implications for Community Development Practitioners," *Journal of the Community Development Society* 22(1): 56-82.
- "Development Practitioners," *Journal of the Community Development Society* 22(1): 56-82.
- Pulver, Glen C. 1989. "Developing a Community Perspective on Rural Economic Development." *Journal of the Community Development Society* 20(2): 1-14.
- Shapira, Philip. 1990. "Modern Times: Learning from State Initiatives in Industrial Extension and Technology Transfer." *Economic Development Quarterly* 4(3): 186-202.
- Smith, Stephen M., and David L. Barkley. 1988. "Labor Force Characteristics of 'High Tech' Manufacturing in Non-metropolitan Counties in the West." *Journal of the Community Development Society* 19(1): 21-36.