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NORTHERN GREAT PLAINS MANUFACTURERS: ASSISTANCE NEEDS AND POTENTIAL ECONOMIC CONTRIBUTIONS

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Abstract. *The past decade has been a period of turmoil for the manufacturing sector in both the U.S. and Canada, and rural manufacturing firms in both countries have been subjected to substantial competitive pressures. The purpose of this study was to identify the firms that comprise the manufacturing sector in North Dakota and in the Provinces of Manitoba and Saskatchewan, and to identify their needs in order to increase economic activity in the region. Data came from a survey of 333 firms conducted in 1991. Overall, the findings indicate that the firms comprising the manufacturing sector in Manitoba and Saskatchewan are quite similar to their North Dakota counterparts. Many are relatively new, and most are relatively small. The Canadian firms have experienced less favorable recent trends in sales and employment growth. However, with substantial experience and widespread interest in international trade, combined with substantial excess capacity, the Canadian firms may be well positioned to take advantage of the opportunities offered by the U.S.-Canada Free Trade Agreement and the North American Free Trade Agreement.*

The past decade has been a period of turmoil for the manufacturing sector in both the U.S. and Canada, and rural manufacturing firms in both countries have been subjected to disproportionately high levels of economic stress (Kale and Lonsdale 1987). The globalization of markets and increasingly rapid changes in technology are among the factors that have challenged North American manufacturers and led to restructuring in many industries (Ahlbrandt 1988; Saskatchewan Rural Development 1989). Restructuring has led to plant closures or reductions in the scale of operations, as well as to decentralization of some industries. This, in turn, has led firms to increase their reliance on out-sourcing for components as an alternative to in-house production; others have sought branch plant locations that could

lead to a reduction in production and/or distribution costs (Rosenfeld et al. 1992).

The restructuring of the manufacturing sector and the resulting changes in rural manufacturing have led to a re-examination of the role of manufacturing in economic development (Pulver 1989; Saskatchewan Rural Development 1989; Leistritz 1991). This re-examination has included analyses of the role of different types of firms (e.g., new v. established, manufacturing v. services) in creating jobs, as well as examination of the economic linkages of different types of new entities (Birch 1987; Popovich and Buss 1989; Leistritz 1992; Leistritz and Wanzek 1992). At the same time, some states, provinces, and other governmental units have responded to these changes by attempting to take a more active role in assisting their manufacturing sectors through programs of technical and/or financial assistance (Ahlbrandt 1992; Bergman 1990; Chapman et al. 1990; Eisinger 1991; Fosler 1988; Saskatchewan Rural Development 1989; Shapira 1990).

In recent years, the prospect of increased trade between Canada and the United States has been a topic of growing interest to policy makers at all levels. The U.S.-Canada Free Trade Agreement and North American Free Trade Agreement will almost certainly lead to a greater volume of trade between the two countries and will create both opportunities and challenges for manufacturers of specific types of goods (Taylor 1988; Roberts and Smith 1992).

In order for policy makers to make informed decisions regarding assistance to the manufacturing sector (e.g., financing or technology commercialization or transfer), current information about the composition of the manufacturing sector and the needs of its firms is essential. Such information also is important to those concerned with the impacts of the North American Free Trade Agreement.

The purpose of this study was to identify the firms that comprise the manufacturing sector in North Dakota and in the Provinces of Manitoba and Saskatchewan, and to identify their needs in increasing economic activity in the region. Specific objectives were to

1) describe the firms that make up the manufacturing sector, in terms of such characteristics as their products, employment, suppliers, and related attributes; and
2) identify their specific needs for financing and technical assistance.

Procedures

Information needed to fulfill the project objectives was obtained from a mailed survey of manufacturers in the three states/provinces. The initial survey lists were developed from listings maintained by state and provincial agencies and manufacturers' associations. The objective was to include all manufacturers of Standard Industrial Classification (SIC) Groups 20-39 in the survey. However, the source lists undoubtedly differed both in currency and coverage. A 16-page questionnaire was mailed to more than 1500 firms during the summer of 1991. A total of 214 North Dakota firms returned useable surveys, which constituted an effective response rate (after accounting for firms that had ceased operations) of 58% of the manufacturing firms in the state that serve markets outside the local area (Leistritz and Wanzek 1992). A total of 119 Canadian firms, 61 from Manitoba and 58 from Saskatchewan, returned useable surveys. The effective response rate by the Canadian firms was about 11%. The lower response rate in Canada was likely the result of budget constraints that allowed for only one mailing to the Canadian firms, whereas the North Dakota companies received two mailed questionnaires plus a follow-up telephone call. Because of the low response rate for Canadian firms, caution is appropriate in generalizing from the sample to the population of firms in these provinces.

The results of the survey are summarized in the sections that follow. These sections 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

About three-fourths of the manufacturing establishments that responded to the survey were the only facility operated by their ownership firm (Table 1). However, Canadian firms were more likely to report that they were the headquarters of a firm with facilities at multiple locations (21%) than were the North Dakota firms (13%). Firms that had been started in 1980 or later made up a large percentage of the respondents from both North Dakota (44%) and Canada (42%), but the percentage of relatively new firms was much lower in Manitoba than in Saskatchewan. The relatively low response rate obtained in Canada could be one explanation for this difference. In addition, the initial lists of Manitoba firms may not have been as current as those for Saskatchewan and North Dakota.

TABLE 1
SELECTED CHARACTERISTICS OF RESPONDENT MANUFACTURING FACILITIES IN NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN, 1991

Characteristic	North Dakota	Manitoba	Saskatchewan	Canada Total*
	----------percent----------			
Type of establishment				
Only location of firm	78.8	73.8	73.7	73.7
Headquarters of firm	13.2	23.0	19.3	21.2
Branch or regional office	8.0	3.3	7.0	5.1
Year firm started in this community				
1980 and after	44.0	25.4	58.9	41.7
1970-1979	25.0	22.1	25.0	23.5
1950-1969	18.5	22.0	9.0	15.7
Before 1950	12.5	30.5	7.1	19.1
Functions performed				
Assembly	73.6	67.2	76.0	71.3
Fabrication	68.5	75.9	78.0	76.9
Production design	67.4	63.8	82.0	72.2
Research and development	48.9	50.0	72.0	60.2
Marketing research	30.5	32.8	36.0	34.3
Feasibility studies	20.9	27.6	18.0	23.1
Type of product				
Durable goods	66.0	64.0	77.1	70.4
Nondurable goods	34.0	36.0	22.9	29.6
High-tech firms	10.9	21.2	18.8	20.0
Agribusiness firms	24.2	15.4	25.0	20.0
New firms since 1987	14.5	1.7	10.7	6.1
Firms established prior to 1987				
Less than 20 employees in 1987	63.5	59.3	73.2	66.1
20 employees or more in 1987	22.0	39.0	16.1	27.8

* Combined data from the two provinces in this study, Manitoba and Saskatchewan.

When asked about the functions their firm performs, a substantial majority of the respondents in each state/province reported that their firm was engaged in assembly, fabrication, and/or production design. Slightly less than half of the North Dakota firms, but more than 60% of the Canadian firms, reported some research and development activities. Research and development activity was more likely to be reported by new firms (established less than five years) in North Dakota than by firms that had been established for a longer period (63% v. 48%). However, there was little difference among the Canadian firms. Marketing research was an activity undertaken by about one-third of the respondents in each geographic area. Market research was reported somewhat more frequently by new firms in both North Dakota and Canada than by their counterparts that had been established for more than five years.

Durable goods manufacturers dominated the sample, accounting for 64% of respondent firms in Manitoba, 66% in North Dakota, and 77% in Saskatchewan. Firms that fall into the SIC categories that have been designated as high-tech (Smith and Barkley 1988) accounted for about 11% of the respondents in North Dakota, 21% in Manitoba, and 19% in Saskatchewan. The high-tech firms also tended to be relatively new. In North Dakota, 55% of the high-tech firms were less than 10 years old, compared to only 34% of the other firm types. In Canada, 41% of high-tech firms were less than 10 years old, compared to 26% of the other firms. Agribusiness firms made up about 24% of the sample in North Dakota and 25% in Saskatchewan, but only 15% in Manitoba. Firms that had been established since 1987 (i.e., less than five years) made up 14.5% of the sample firms in North Dakota, about 11% in Saskatchewan, but less than 2% in Manitoba. It is possible that the original lists used in the survey may have under-represented these new firms in some or all of the provinces/states. Among the firms that had been established prior to 1987, small firms with less than 20 employees in 1987 predominated, comprising about 59% of all firms in Manitoba and North Dakota and 73% in Saskatchewan.

The distribution of respondent firms varied by type of product produced (Table 2). Product groups that are heavily represented among respondents include SIC Group 35, Industrial and Commercial Machinery, which includes a substantial component of farm machinery and equipment manufacturing; SIC Groups 24 and 25, Lumber, Wood Products, and Furniture; SIC Group 20, Food and Kindred Products; and SIC Group 34, Fabricated Metal Products, except machinery and transportation equipment.

TABLE 2
RESPONDENT MANUFACTURING FACILITIES BY STANDARD INDUSTRIAL CLASSIFICATION CATEGORY (SIC), NORTH DAKOTA, MANITOBA AND SASKATCHEWAN FIRMS, 1991

SIC Group	Product Type	Number of Firms			Percent of Total
		North Dakota	Canada*	Total	
20	Food and Kindred Products	27	7	34	11.1
22 & 23	Textile mill products & apparel	9	3	12	3.9
24 & 25	Lumber, wood products, & furniture	31	8	39	12.7
26 & 27	Paper & allied products; printing & publishing	25	4	29	9.4
28	Chemicals	10	14	24	7.8
31	Leather & leather products	0	1	1	0.3
32	Stone, clay, glass & concrete products	19	9	28	9.1
34	Fabricated metal products except machinery & transportation equipment	15	19	34	11.1
35	Industrial & commercial machinery & computer equipment	36	22	58	18.9
36	Electronic & other electrical equipment except computers	7	2	9	2.9
37	Transportation equipment	7	3	10	3.2
38	Instruments	12	5	17	5.5
39	Miscellaneous manufacturing	11	1	12	3.9
	Total	209	98	307	100.0

* Data from Manitoba and Saskatchewan firms combined.

TABLE 3
GROSS SALES OF RESPONDENT MANUFACTURING FACILITIES, NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN (U.S. DOLLARS)

Gross Sales	North Dakota	Manitoba	Saskatchewan	Canada Total*
Gross sales in 1990				
Mean[a]	$9,210,195	$12,043,589	$1,404,730	$6,774,820
Median	650,000	1,140,351	811,403	949,123
	----------percent----------			
Distribution:				
Less than $500,000	44.4	17.0	42.3	29.5
$500,000 to $999,999	12.3	28.3	13.5	21.0
$1,000,000 to $4,999,999	26.6	34.0	38.5	36.2
$5,000,000 to $9,999,999	7.3	5.7	3.8	4.8
$10,000,000 or more	9.4	15.1	1.9	8.6
Change in gross sales, 1990 compared to 1989				
Mean[b]	18.2	7.0	11.1	9.0
Median	10.0	5.0	0.0	4.0

* Combined data from the two provinces in this study, Manitoba and Saskatchewan.
[a,b] North Dakota and Canadian firms were not significantly different at á = 0.05 using the Tukey test.

Sales and Marketing

The gross sales of the respondent firms covered a considerable range. Manitoba had the largest percentage of firms recording sales over $10 million in 1990, about 15% of all firms, while Saskatchewan had the least, only 1.9% (Table 3). The median gross sales values were $650,000 in North Dakota, $811,400 in Saskatchewan, and about $1.1 million in Manitoba. (All sales figures were converted to U.S. dollars for purposes of study.)

TABLE 4
MARKETS AND MARKETING STRATEGIES OF RESPONDENT FIRMS, NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN, 1991

Markets and Marketing Strategies	North Dakota	Manitoba	Saskatchewan	Canada Total*
	----------percent----------			
Where major products are marketed				
Within local market[a]	36.2	33.4	23.6	28.8
Within rest of state/province[a]	21.5	21.1	35.1	27.7
Within rest of country[a]	37.3	34.2	31.9	33.1
International[a]	4.8	11.3	9.4	10.4
Percent of products sold out-of-state/province				
Mean[b]	42.1	45.5	41.3	43.5
Median	30.0	45.0	40.0	43.0

* Combined data from the two provinces in this study, Manitoba and Saskatchewan.
[a,b] North Dakota and Canadian firms were not significantly different at á = 0.05 using the Tukey test.

When gross sales values are compared between 1989 and 1990, it becomes evident that the North Dakota firms fared somewhat better than their Canadian counterparts (Table 3). On average, the North Dakota firms reported an 18% increase in gross sales, Saskatchewan companies 11%, and Manitoba firms 7%. The median values, which are likely more representative of the typical firm, also indicated that North Dakota firms had more positive sales growth experiences from 1989 to 1990.

When asked where they sell their major products, Canadian firms reported a higher percentage of international sales and a somewhat smaller percentage of sales within their local market areas (Table 4). The percentages of respondent firms' products or services that were sold to customers outside their state or province were quite similar for firms in North Dakota, Manitoba, and Saskatchewan, however.

TABLE 5
DISTRIBUTION OF EXPENDITURES BY RESPONDENT FIRMS, 1990

Expenditure Category	Percent of Total Expenditures	Location of Supplier		
		Within State or Province	Rest of Nation	Outside Nation
		----------percent----------		
North Dakota				
Raw materials	30.3	43.3[a]	52.8	3.9
Processed materials	21.9	34.2[b]	62.6	3.2
Labor	27.4	97.8	2.2	0.0
Subcontracting	4.7	74.6	24.3	1.1
Other	15.7	97.0	20.2	0.5
Canada Total*				
Raw Materials	35.1	57.6[a]	31.0	11.4
Processed materials	18.4	55.0[b]	27.2	17.8
Labor	27.1	96.0	4.0	0.1
Subcontracting	5.8	84.2	11.6	4.1
Other	13.6	90.0	16.4	7.5

* Combined data from the two provinces in this study, Manitoba and Saskatchewan.
[a,b] North Dakota and Canadian firms were significantly different at á = 0.05 using the Tukey test.

About 47% of the Canadian firms reported selling some of their products to customers outside Canada, and about 84% plan to serve international markets within the next 5 years. In contrast, only about one-fourth of the North Dakota firms reported international sales, and only about one-half planned to serve international markets within the next 5 years. The substantial level of involvement and/or interest in international trade by the Canadian firms is consistent with the findings of Stabler and Molder (1992).

Expenditures

The expenditures of the firms also were examined (Table 5). The Canadian firms had a somewhat higher percentage of their expenditures for raw materials, and a lower percentage for processed materials, compared to

the North Dakota firms. When the sources of the inputs were compared, the Canadian firms reported obtaining substantially higher percentages of their raw materials from outside Canada, while North Dakota firms were more likely to purchase raw materials from suppliers outside the state but within the United States. Canadian firms purchased a significantly higher percentage of both raw materials and processed materials within the province, compared to purchases by North Dakota firms within the state.

Employment

The median-sized respondent firm in Canada had 15 employees in 1991 (Table 6). Rather surprisingly, the median-sized respondent firm in North Dakota also had 15 employees in 1991. However, in Manitoba and in North Dakota, a few large firms exerted a substantial effect on the mean number of employees; the mean numbers of employees in 1991 were 59 and 54 for Manitoba and North Dakota firms, respectively. By comparison, the mean number of employees for respondent Saskatchewan manufacturing firms was only 20 employees.

When each firms' employment was compared to the level 5 years earlier, it was apparent that the North Dakota firms had achieved the greatest percentage and absolute growth. The average North Dakota firm had experienced a 55% increase in employment, compared to 22% for Saskatchewan companies and 13% for Manitoba firms.

When asked to project their employment 5 years into the future, the Saskatchewan firms expected the largest percentage growth (93%), followed by those in North Dakota (46%). The Manitoba companies anticipated a slightly lower employment level, on average, although the median value was higher. Considering all Canadian firms, expected employment 5 years in the future averaged 48.5 workers, up 22% from the 1991 level.

When the number of current employees was compared to the number 5 years earlier, the average Canadian firm was found to have created 6.3 jobs over the previous 5 years, while the average North Dakota firm had created about 17 jobs (Table 7). About 27% of the Canadian firms reported that they had fewer employees at the time of the survey than 5 years before, and 9% reported no change in the number employed. In comparison, 13% of respondent North Dakota manufacturers had fewer employees and 11% had the same number of employees as they had 5 years earlier. About 44% of the respondents in both Canada and North Dakota reported that their firm had added between 1 and 10 jobs over the last 5 years.

TABLE 6
CURRENT, PAST, AND PROJECTED EMPLOYMENT
OF NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN
MANUFACTURING FIRMS, 1991

Employment	Unit	North Dakota	Manitoba	Saskatchewan	Canada Total*
Total employment, current					
Mean[a]	number	54.0	59.2	20.2	39.9
Median	number	15.0	14.5	15.0	15.0
Total employment, five years ago					
Mean[b]	number	34.8	52.4	16.5	35.1
Median	number	7.0	15.0	11.0	12.5
Total employment, five years from now					
Mean[c]	number	79.1	57.0	39.0	48.5
Median	number	27.5	22.0	26.0	24.0

* Combined data from the two provinces in this study, Manitoba and Saskatchewan.
[a,b,c]North Dakota and Canadian firms were not significantly different at á = 0.05 using the Tukey test.

When job creation was compared by firm type, the Canadian and North Dakota firms had some patterns that were similar and others that were different. For both regions, the larger, more established firms which had been in existence at least 5 years and which had 20 or more employees in 1987 created substantially more jobs than firms with fewer than 20 employees 5 years earlier. New firms created within the previous 5 years were intermediate between the larger and smaller established firms in terms of the number of jobs created per firm. In general, the findings with respect to firm size are similar to those of Storey (1985), who found that, while small firms as a whole did create a substantial number of jobs, a large proportion of jobs were created by a small number of rapidly growing companies.

TABLE 7
JOBS CREATED IN THE LAST FIVE YEARS BY CANADIAN* AND NORTH DAKOTA FIRMS OF DIFFERENT TYPES, 1991

Item	All Firms	Firm Type: New Firms	Established Firms: Less than 20 Employees	Established Firms: 20 or More Employees	Firm Type: NonDurable Mfgrs	Firm Type: Durable Mfgrs	Firm Type: Agribusiness	Firm Type: Other	Firm Type: High-Tech	Firm Type: Other
Canadian Firms:										
Current employment:										
Mean	39.9	10.6	13.3	108.6	68.4	26.5	31.4	39.2	24.6	41.2
Median	15.0	9.5	12.0	46.5	15.0	14.5	14.0	15.0	13.5	14.0
Jobs created in last 5 years:										
Mean (Number)	6.3	8.0	4.4**	11.1**	18.9	6.3	3.1	11.2	7.3	10.4
Median (Number)	3.0	8.0	3.0	1.0	3.0	3.0	1.0	3.0	3.0	3.0
Distribution of jobs:	----------	----------	----------	----------	percent	----------	----------	----------	----------	----------
Fewer jobs	26.9	0.0	19.7	40.6	30.8	23.4	35.3	24.0	26.3	26.0
No change	9.3	0.0	11.3	6.3	3.8	10.9	11.8	8.0	10.5	8.2
1-10	44.4	100.0	56.3	18.8	38.5	48.4	41.2	46.7	42.1	46.6
11-25	12.0	0.0	12.7	9.4	7.7	12.5	5.9	12.0	15.8	9.6
26-50	3.7	0.0	0.0	12.5	7.7	3.1	5.9	4.0	0.0	5.5
51-100	0.9	0.0	0.0	3.1	3.8	0.0	0.0	1.3	0.0	1.4
Over 100	2.8	0.0	0.0	9.4	7.7	1.6	0.0	4.0	5.3	2.7
North Dakota Firms:										
Current employment:										
Mean	54.0	32.3	14.8	165.5	82.8	41.5	114.5	35.7	62.5	53.2
Median	15.0	12.0	10.0	65.5	21.0	15.0	23.0	14.0	31.5	14.0
Jobs created in last 5 years:										
Mean (Number)	17.1	32.3	5.6**	37.8**	22.5	14.9	36.9**	11.2**	23.8	16.4
Median (Number)	4.0	12.0	2.0	13.0	3.0	5.0	5.0	4.6	13.0	4.0
Distribution of jobs:	----------	----------	----------	----------	percent	----------	----------	----------	----------	----------
Fewer jobs	13.1	0.0	14.9	15.9	19.3	10.4	14.6	12.8	5.0	14.3
No change	11.4	4.6	16.8	2.3	12.3	11.3	14.6	10.5	0.0	13.0
1-10	44.0	45.5	51.5	27.3	36.8	46.3	26.8	48.9	40.0	44.2
11-25	20.0	31.8	13.9	27.3	21.1	20.0	29.3	17.3	25.0	19.5
26-50	4.6	4.6	1.0	11.4	3.5	5.2	4.9	4.5	15.0	3.3
51-100	3.4	9.1	2.0	4.5	0.0	5.2	2.4	7.8	10.0	2.6
Over 100	3.4	4.6	0.0	11.4	7.0	1.7	2.3	2.3	5.0	3.3

* Combined data from the two provinces in this study, Manitoba and Saskatchewan.

** Significant difference at á = .05 using Tukey Test.

The dominance of the job creation statistics by a few rapidly growing companies is dramatically revealed by the survey results. Considering the North Dakota and Canadian firms together, new and growing establishments had created a total of 4,463 jobs over the preceding 5 years. However, 2,490 jobs or 56% of total jobs created by respondent firms were created by only 13 firms, or only 5% of all respondent firms. These 13 firms had created an average of 192 new jobs each, comprising an average of 39% of their total current employment. The next 5% of respondent firms had created a total of 506 new jobs, which amounted to an average of 42 new jobs per firm or 37% of those firms' current employment.

In both countries, the nondurable goods manufacturers had created substantially more jobs per firm than their counterparts that produced durable goods. However, the nondurable manufacturers also had substantially higher total employment levels in both countries (Table 7). Canadian agribusinesses recorded substantially fewer new jobs than other firms, whereas agribusiness firms in North Dakota created more than three times as many jobs per firm as other companies. However, the Canadian agribusiness firms had fewer total employees than other Canadian manufacturers, both at the time of the survey and five years previously, whereas North Dakota agribusinesses had an average employment level that was more than double that of other respondent manufacturers. Similarly, the high-tech firms created fewer jobs per firm than other companies in Canada, but more jobs per firm in North Dakota. Again, the difference in job creation reflected differences in overall employment levels (i.e., the firms with higher total employment levels also accounted for more job creation).

The respondents also were asked about past and projected changes in employment for specific occupational groups (Table 8). Over the past five years, Canadian firms reported above-average growth rates in professional specialties, clerical workers, and operators and fabricators, while North Dakota firms had the greatest percentage growth in laborers, sales representatives, and precision production, craft, and repair workers. Considering their plans for the next five years, the Canadian firms anticipated that the highest growth rates would occur for sales representatives, precision production craft and repair, and professional specialty workers, while North Dakota firms expected the most rapid growth to occur for sales representatives, operators and fabricators, and professional specialty workers. Economic development officials and human resource specialists may wish to take such projections into account in planning future programs.

TABLE 8
EMPLOYMENT BY OCCUPATIONAL CATEGORY AND PAST AND PROJECTED CHANGES FOR NORTH DAKOTA AND CANADIAN MANUFACTURERS, 1991

Occupational Category	Current Employment: Avg. No. Per Firm[a]	Current Employment: Percent	Percent Change: From Five Years Ago[b]	Percent Change: Expected Five Years From Now[c]
North Dakota				
Executive, administrative, and managerial	4.8	8.9	34.0	12.4
Professional specialty	3.6	6.7	47.0	23.7
Sales representatives	2.4	4.4	39.9	64.3
Clerical workers	4.3	8.0	39.1	14.3
Precision production, craft, and repair	9.3	17.2	68.0	21.2
Operators and fabricators	18.5	34.3	36.8	37.2
Laborers	10.9	20.2	46.2	12.6
Other	0.3	0.6	40.4	27.7
Total Employees Per Firm	54.1	100.3	51.7	25.9
Canada Total*				
Executive, administrative and managerial	3.5	8.8	17.6	-0.5
Professional specialty	1.8	4.5	50.0	14.2
Sales representatives	2.9	7.3	37.8	58.7
Clerical workers	2.9	7.3	39.7	-8.3
Precision production, craft, and repair	4.8	12.0	14.9	15.9
Operators and fabricators	12.6	31.6	34.3	5.2
Laborers	5.6	14.0	32.0	2.6
Other	5.8	14.5	-15.2	-82.3
Total Employees Per Firm	39.9	100.0	20.9	-3.8

* Combined data from the two provinces in this study, Manitoba and Saskatchewan.
[a,b,c] North Dakota and Canadian firms were not significantly different at á = 0.05 using the Tukey test.

Financing

For manufacturers, as for many other types of businesses, financing is a frequent need (Lamberson and Johnson 1992; Gruidl 1991; Shaffer and Pulver 1985). Most of the responding firms had sought financing during the previous 12 months (Table 9). Only 20% of Manitoba companies, about 19%

TABLE 9
NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN MANUFACTURERS' EFFORTS TO SECURE FINANCING IN THE LAST 12 MONTHS, 1991

Efforts to Secure Financing	North Dakota	Manitoba	Saskatchewan
	----------percent----------		
Total number of loans sought:			
Mean[a]	1.9	1.7	1.8
None	18.3	20.0	18.9
One	29.9	34.0	28.3
Two	27.4	24.0	32.1
Three	15.2	16.0	7.5
Four or more	9.2	6.0	13.3
Tried to secure a loan for:			
New equipment	40.1	31.7	33.3
New building	15.5	11.9	5.3
Working capital	47.6	46.7	47.4
Overall business operation	30.6	29.3	31.6
Refinancing old debts	14.5	8.6	15.8
Number of financial institutions contacted:			
Mean[b]	1.6	1.4	1.4
Distribution			
One	64.7	69.8	72.7
Two	16.5	23.3	20.5
Three	11.3	7.0	4.5
Four	7.5	0.0	2.3
Encountered difficulty in obtaining financing:[c]			
All firms	32.4	31.1	42.2
Nondurable	24.0	20.0	55.6
Durable	36.6	28.6	43.3
New	50.0	0.0	40.0
Established (<20 employees)	27.1	34.8	42.4
Established (20/+ employees)	32.3	30.0	33.3
Agribusiness	50.0	60.0	50.0
High-tech	37.5	22.2	55.6

[a,b,c]North Dakota and Canadian firms were not significantly different at á = 0.05 using the Tukey test.

of Saskatchewan firms, and 18% of North Dakota manufacturers indicated that they had not sought external financing. Working capital was the purpose for which credit was most often needed, followed by new equipment. Most firms had contacted only one financial institution, and few had contacted more than two. About one-third of the manufacturers in Manitoba and North Dakota reported difficulty in obtaining financing, but 42% of those in Saskatchewan had such problems. When the frequency of financing problems was compared among firm types, there were few consistent patterns.

Commercial banks were the most commonly used credit source for manufacturers in each province/state. Of the loans received by the survey firms, commercial banks were the source of 62% of loans in North Dakota, 69% of loans in Saskatchewan, and 90% of loans in Manitoba. The predominant role of commercial banks in providing local financing for firms in the northern Great Plains is consistent with the findings of Gruidl (1991) for firms in downstate Illinois.

The manufacturers were asked what factors most restrained expansion of their production capacities. *Finance* was the most often cited limiting factor in each province/state. The respondents also were asked about the extent to which their production capacity was currently utilized. The North Dakota producers reported the highest capacity utilization with an average of 76%, followed by a 67% average capacity utilization for Manitoba firms, and an even lower 57% average capacity utilization by Saskatchewan companies. Almost 46% of the Saskatchewan firms reported utilizing 50% or less of their production capacity, compared to 25% of North Dakota companies and 24% of Manitoba firms using 50% or less of production capacity.

Future Plans and Needs for Technical Assistance

The manufacturers were asked about their plans for business changes in the next two years. *Increasing market share* was the business objective most frequently cited by respondents in each province/state (Table 10). Other changes that were mentioned by a majority of the respondents in each area were *marketing existing products to different customers, increasing production capacity,* and *adding new products.* About two manufacturers in five planned to *redesign their product line,* generally with a goal of *marketing to new customers. Diversification* was a goal for more than one-fourth of the firms in each area. The need perceived by these firms to seek new markets and market niches is consistent with observations by Ahlbrandt

TABLE 10
RESPONDENTS' PLANS FOR BUSINESS CHANGES
IN THE NEXT TWO YEARS, 1991

Type of Change	North Dakota	Manitoba	Saskatchewan
	----------percent----------		
Increase market share	80.0	90.2	87.9
Market existing products to different customers	76.5	70.5	75.9
Increase production capacity	74.5	60.7	69.0
Add new product	67.0	70.0	82.8
Redesign product line:			
Market to new customers	41.5	41.0	41.4
Market to same customers	38.5	24.6	37.9
Diversify	26.5	29.5	37.9
Add new building	25.5*	9.8*	20.7
Add new branch	7.0	13.1	8.6
Relocate	7.0	15.3	5.2

* North Dakota and Manitoba respondents were significantly different at á = 0.05 using the Chi Square test.

(1992) and Rosenfeld et al. (1992) regarding the effects of global competition on the manufacturing sector.

The relatively high percentage of the firms that plan to increase their production capacity is somewhat surprising in view of the relatively low rates of current capacity utilization reported by many firms. However, many of the firms that indicated plans to expand production capacity also planned to increase their market share (86%), redesign their product line in order to market to new customers (43%), or add new products (75%).

TABLE 11
TRAINING AND EDUCATIONAL ASSISTANCE NEEDS
OF NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN
MANUFACTURERS, 1991

Area of Need	North Dakota	Manitoba	Saskatchewan
	----------mean score*----------		
Operator training	3.4	3.3	3.9
Computer-aided design	3.6	3.8	3.8
Basic computer skills	3.4	3.4	3.4
Computer-aided manufacturing	3.8	4.0	3.9
Quality control	3.1	3.1	2.8
Management training	3.1	3.0	2.9
Marketing and sales	2.7	2.8	2.3
Exporting	3.6[a,b]	3.1[a]	2.6[b]
Quality assurance	3.1	3.2	2.8
Financing	3.2	3.4	3.2
Labor relations	3.4	3.7	4.0

* Based on a scale of 1 (critically important) to 5 (not important).
[a] North Dakota and Manitoba respondents are significantly different at á = 0.05 using the Kruskal-Wallis test.
[b] North Dakota and Saskatchewan respondents are significantly different at á = 0.05 using the Kruskal-Wallis test.

The manufacturers also were asked about areas in which they might need worker training and educational assistance. Of the training and educational assistance areas specified, *marketing and sales* was the topic that was rated as most important by the respondents in each province/state (Table 11).

Other topics that were highly rated by the respondents were *quality control, management training, exporting*, and *quality assurance*. The Canadian firms gave *exporting* a higher rating than the North Dakota firms.

Based upon a scale from 1, critically important, to 5, not important, the mean scores for the various areas of training and educational assistance generally tended to be somewhat below the midpoint value of 3, suggesting that the typical responding firm considered such assistance to be relatively unimportant. However, some of the areas of training and education were rated as critically important (1) or very important (2) by substantial proportions of firms. Among the North Dakota firms, for example, *marketing and sales* was rated as critically or very important by 54%, *quality assurance* and *quality control* each received these ratings from 40% of the firms, *management training* was considered critically or very important by 39%, *financing* by 37%, and *operator training* by 33%. Hence, there is evidence that the education and training needs of manufacturers are quite diverse, so that public or other entities attempting to address these needs should be able to provide expertise in a variety of training categories.

When the manufacturers were asked about areas where they might perceive a need for technical consulting assistance, *marketing studies* ranked first in North Dakota and tied for second in both Manitoba and Saskatchewan (Table 12). The top ranked area for technical assistance for the Canadian firms was *developing international markets*. Other topics that received relatively high technical assistance needs ratings were *research and development, process improvement*, and *quality assurance*. Significant differences in the ratings between the three groups of manufacturers were found only for *developing international markets* and for *industrial waste management*.

Similar to the situation with regard to training and education, the mean scores for the various types of technical assistance indicate that responding firms with average or typical characteristics considered their technical assistance needs to be rather unimportant. But some areas of technical assistance were rated as critically or very important by a substantial segment of respondents. For example, *marketing studies* was rated as critically or very important by 45% of North Dakota firms. Three other types of technical assistance were rated as critically or very important by 30 to 39% of North Dakota firms, and nine areas were viewed as critically or very important by 20 to 29% of the respondents. Governmental or other organizations that seek to serve manufacturers' technical assistance needs clearly should offer access to a wide range of technical consultant expertise.

TABLE 12
MANUFACTURERS' NEEDS FOR TECHNICAL ASSISTANCE
(CONSULTING) BY SUBJECT AREA, 1991

Subject Area	North Dakota	Manitoba	Saskatchewan
	----------mean score*----------		
Accounting and records	3.7	3.9	4.1
Human resource management	3.7	3.9	4.0
Financial analysis/cost	3.4	3.6	3.3
Computer system	3.3	3.4	3.7
Inventory control	3.3	3.4	3.6
Plant layout and design	3.7	3.7	4.0
Production control	3.4	3.4	3.4
Research and development	3.4	3.2	3.3
Marketing studies	2.9	3.1	2.8
Strategic planning design	3.4	3.5	3.4
Process improvement	3.2	3.4	3.4
Material handling	3.5	3.5	3.7
Industrial waste management	3.8[a]	4.1	4.3[a]
Prototype testing	4.0	3.9	3.7
Product-process development	3.6	3.5	3.6
Product and process commercialization	3.8	3.8	3.5
Developing international markets	3.5[a,b]	2.9[b]	2.4[a]
Government/manufacturing specification	3.7	3.8	3.5
Quality assurance	3.0	3.1	2.8

* Based on a scale from 1 (critical) to 5 (not important).
[a] North Dakota and Saskatchewan respondents are significantly different at á = 0.05 using the Kruskal-Wallis test.
[b] North Dakota and Manitoba respondents are significantly different at á = 0.05 using the Kruskal-Wallis test.

Conclusions

Economic development and diversification has become a high priority concern for state and provincial policy makers in the northern Great Plains. The manufacturing sector often is expected to play a major role in future economic development. In addition, the U.S.-Canada Free Trade Agreement and North American Free Trade Agreement may create both opportunities and challenges for some manufacturers. This study was undertaken to increase understanding of the firms that comprise the manufacturing sector in North Dakota, Manitoba, and Saskatchewan.

Survey information received from 333 respondent manufacturing firms (214 in North Dakota, 61 from Manitoba, and 58 from Saskatchewan) constituted the data base for the analysis. Most of the respondent manufacturing firms were engaged in producing durable goods (66% in North Dakota and 70% in the Canadian provinces).

Many of the participating firms were relatively young. About 59% of the Saskatchewan companies and 44% of the North Dakota firms but only 25% of the Manitoba manufacturers had been established after 1979. Many of the firms also were quite small. The median respondent firm in North Dakota and in the two Canadian provinces had 15 employees. However, the North Dakota companies had achieved a much greater average increase of 44% in their employment over the previous 5 years, compared to 14% increase for respondent Canadian firms. About 57% of the North Dakota companies and 50% of the Canadian companies reported that their 1990 gross sales were less than $1 million. When the firms compared their gross sales for 1990 with those for 1989, the North Dakota firms had done better than their Canadian counterparts; the average annual change in sales reported by North Dakota firms was 18% compared to 9% for Canadian companies.

The Canadian firms were more oriented to international marketing and sales than their North Dakota counterparts. About 47% of the Canadian companies reported selling some of their products to customers outside the country, compared to one-fourth of North Dakota firms. And about 84% of Canadian firms planned to serve international markets within 5 years, compared to one-half of the North Dakota firms.

Another substantial contrast between the North Dakota manufacturers and their Canadian counterparts was the extent to which their plant's production capacity was currently utilized. North Dakota firms reported an average of 76% utilization, followed by 67% utilization by Manitoba firms, and 57%

utilization by Saskatchewan firms. It should be noted, however, that many of the firms planned to increase production in the near future, and a substantial number also indicated plans to expand their production capacity.

Financing was identified as a problem by about one manufacturer in four. While there were few consistent patterns regarding the incidence of financing problems by type of firm, new firms (established less than five years), high tech firms, and agribusinesses tended to report these problems most frequently. The survey findings appear generally consistent with the observations of Drabenstott and Morris (1991) that, while adequate supplies of capital are generally available to rural businesses that are able to pay market rates, new firms and those with needs that differ substantially from those of typical rural businesses (e.g., high tech firms) may have difficulty obtaining the financing they need. Selective public programs may be warranted to solve some of these problems.

When asked about areas where they saw a need for technical consulting assistance, and for training and educational assistance, the Canadian firms tended to place a higher priority on developing international markets. In other respects, the technical and training needs of respondent Canadian firms tended to be similar to those of their U.S. counterparts. The ratings given by the firms to the different types of training and educational assistance and the various categories of technical assistance may have implications for agencies which provide such assistance. The high priority given to market analysis, including development of international markets, indicates that this area must be accorded high priority in the provision of technical training and educational efforts by governmental and other assistance agencies.

The survey results also indicate the diversity of technical assistance needs perceived by manufacturing firms. Each of the 19 technical assistance subject areas listed on the survey questionnaire was rated as critically important or very important by 20% or more of the respondent firms. Hence, entities that attempt to provide technical assistance to the manufacturing sector likely will need to employ specialists with a wide range of skills and expertise, or develop relationships with universities or other organizations to enable them to draw upon personnel with specialized skills.

Overall, the firms that comprise the manufacturing sector in Manitoba and Saskatchewan are quite similar to their North Dakota counterparts. Many are relatively new, and most are relatively small. The Canadian firms have experienced less favorable recent trends in sales and employment growth. However, with their substantial excess manufacturing capacity and

widespread interest in international trade, the Canadian firms may be better positioned to take advantage of the opportunities offered by the U.S.-Canada Free Trade Agreement and the North American Free Trade Agreement.

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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):252-64.

Ahlbrandt, Roger S., Jr. 1992. Helping small manufacturing companies become more competitive: A model and an evaluation. *Economic Development Review* 10(1):67-71.

Bergman, Edward M. 1990. State Innovation Policies and Regional Restructuring of Technologically Dependent. In *Growth Policy in the Age of High Technology*, J. Schmandt and R. Wilson, eds., 127-45. Winchester, MA: Unwin Hyman, Inc.

Birch, D. L. 1987. *Job Creation in America: How Our Smallest Companies Put the Most People to Work*. New York: The Free Press.

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, DC: U.S. Dept. of Commerce.

Drabenstott, Mark, and Charles Morris. 1991. Financing rural businesses: What role for public policy? *Economic Review* (Federal Reserve Bank of Kansas City) 74:30-45.

Eisinger, Peter. 1991. The rise of state venture capitalism. *Economic Development Quarterly* 5(1):64-76.

Fosler, R. Scott, ed. 1988. *The New Economic Role of American States: Strategies in a Competitive World Economy*. New York: Oxford University Press.

Gruidl, John S. 1991. *New Businesses in Downstate Illinois*. Macomb, IL: Western Illinois University, Illinois Institute for Rural Affairs.

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.

Lamberson, Morris, and Clint Johnson. 1992. Financing experiences of small manufacturers in Arkansas: Survey and analysis. *Economic Development Review* 10(2):62-6.

Leistritz, 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.

Leistritz, F. Larry. 1992. Economic impacts of new and expanding firms in the upper Great Plains. *Review of Agricultural Economics* 14(1):81-91.

Leistritz, F. Larry, and Janet K. Wanzek. 1992. *North Dakota Manufacturers: Attributes and Needs Assessment.* Fargo: North Dakota Agricultural Experiment Station.

Popovich, M. G., and T. F. Buss. 1989. Entrepreneurs find niche even in rural communities. *Rural Development Perspectives* 5:11-4.

Pulver, Glen C. 1989. Developing a community perspective on rural economic development. *Journal of the Community Development Society* 20(2):1-14.

Roberts, Karen, and Phillip R. Smith. 1992. The effect of labor cost differences on the location of economic activity under the U.S.-Canada Free Trade Agreement. *Economic Development Quarterly* 6(1):52-63.

Rosenfeld, Stuart, with Philip Shapira and J. Trent Williams. 1992. *Smart Firms in Small Towns.* Washington, DC: The Aspen Institute.

Saskatchewan Rural Development. 1989. *Economic Development and Diversification in Rural Saskatchewan.* Proceedings of conference sponsored by Saskatchewan Rural Development and University of Saskatchewan. Saskatoon: University of Saskatchewan.

Shaffer, Ron E., and Glen C. Pulver. 1985. Regional Variations in Capital Structure of New Small Businesses: The Wisconsin case, In *Small Firms in Regional Economic Development: Britain, Ireland, and the United States*, D. J. Storey, ed., 101-34. Cambridge, England: Cambridge University Press.

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 nonmetropolitan counties in the west. *Journal of the Community Development Society* 19(1):21-36.

Stabler, Jack C., and Pauline J. Molder. 1992. *Rural Manufacturing Industry: Products, Markets, and Location Requirements*. Saskatoon: University of Saskatchewan, Department of Agricultural Economics.

Storey, D. J. 1985. *Small Firms in Regional Economic Development: Britain, Ireland, and the United States*. Cambridge, England: Cambridge University Press.

Taylor, Teresa. 1988. *The U.S.-Canada Free Trade Agreement: Winners and Losers in the Northeast-Midwest Region*. Washington, DC: Northeast-Midwest Institute.