Agricultural Economics Miscellaneous Report No. 162

Rural Manufacturers

Attributes, Intentions and Needs of Manitoba, North Dakota and Saskatchewan Firms

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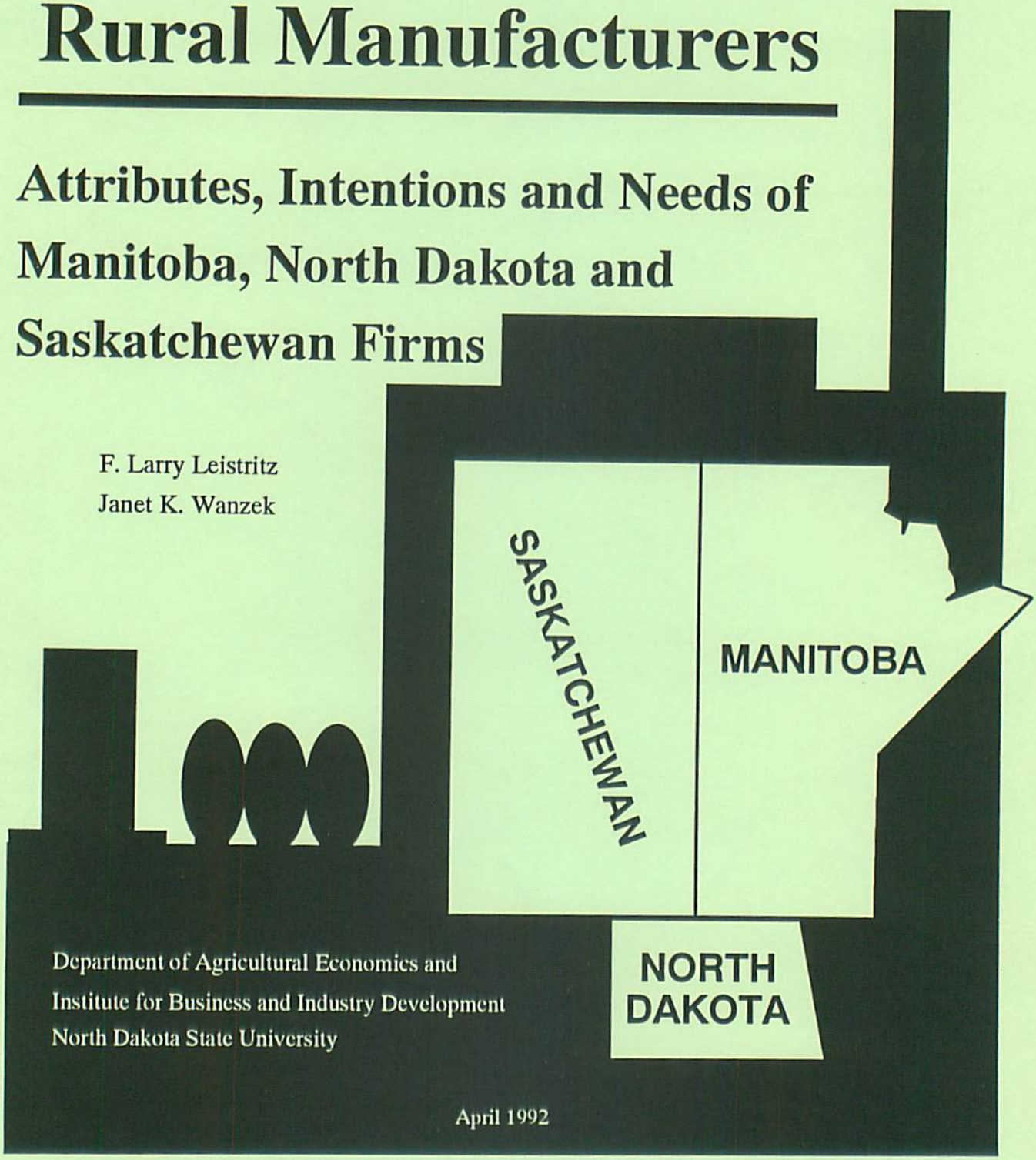

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April 1992

Preface

The authors are indebted to the more than 300 manufacturers who completed the extensive questionnaires that form the data base for this report. Without the cooperation of these individuals, this report could not have been completed.

Special recognition for financial support is given to the Economic Development Administration, U.S. Department of Commerce, to the Cooperative Research Service of the U.S. Department of Agriculture, to the North Dakota Department of Economic Development and Finance, to the North Dakota Agricultural Experiment Station, and to the NDSU Institute for Business and Industry Development.

Our thanks also go to Mahnaz Eshetu, Sharon Hilber, and JoAnn Thompson for their assistance in the data collection phase of the project, to Rita Hamm for her assistance in designing the survey instrument and in editing the report, and to Carol Jensen, our typist. The authors accept sole responsibility for any omissions or errors.

Project No. 05-25-02460

This report (work) was prepared pursuant to the receipt of financial assistance from the United States Government and the State of North Dakota. The statements, findings, conclusions, recommendations, and other data in the report are solely those of the authors, the recipient, and do not necessarily reflect the views of the United States Government of State of North Dakota.

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Highlights

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 increase our understanding of the firms that comprise the manufacturing sector in North Dakota and in the Provinces of Manitoba and Saskatchewan. Data came from a survey of firms conducted in 1991. A total of 333 firms (214 from North Dakota, 61 from Manitoba, and 58 from Saskatchewan) returned useable surveys.

Durable goods manufacturers dominated the sample, accounting for 65 percent in Manitoba, 66 percent in North Dakota, and 78 percent in Saskatchewan. Many of the participating firms were relatively new; about 59 percent of the Saskatchewan companies and 44 percent of the North Dakotas firms, but only 25 percent of the Manitoba manufacturers, had been established since 1979. Many of the firms also were quite small; about 57 percent of the North Dakota companies and 44 percent of those in Canada reported that their 1990 gross sales were less than $1 million. The Canadian firms were more oriented to international marketing and sales than their North Dakota counterparts. Another substantial contrast between the North Dakota manufacturers and their Canadian counterparts was the extent of their plant's production capacity that was currently being utilized. North Dakota firms reported an average of 76 percent utilization, followed by Manitoba (67 percent) and Saskatchewan (57 percent) companies.

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 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.

Rural Manufacturers: Attributes, Intentions and Needs of Manitoba, North Dakota and Saskatchewan Firms

F. Larry Leistritz and Janet K. Wanzek*

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 closure of some plants and reductions in the scale of operations of others, as well as to decentralization of some industries. This, in turn, has led some 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.

The restructuring of the manufacturing sector and the changes in rural manufacturing that have resulted have led to a re-examination of the role of manufacturing in economic development (Pulver 1989; Saskatchewan Rural Development 1989; Leistritz 1991). 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 (Bergman 1990; Chapman et al. 1990; Eisinger 1988, 1991; Fosler 1988; Saskatchewan Rural Development 1989; Shapira 1990).

In the Upper Great Plains states and the adjoining Prairie Provinces of Canada, the last decade has been an economically difficult time. With economies that are heavily dependent on agriculture, natural resources, and the energy industry, the states and provinces in this region have experienced economic problems during much of the last ten years. Understandably, economic development and diversification have become a high priority for state and provincial policy makers (Saskatchewan Rural Development 1989; Leistritz 1991), and the manufacturing sector is generally expected to play a substantial role in future economic development.

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 will almost certainly lead to a greater

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volume of trade between the two countries and will create both opportunities and challenges for manufacturers of specific types of goods (Taylor 1988).

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 Free Trade Agreement.

The **purpose** of this study was to increase our understanding of the firms that comprise the manufacturing sector in North Dakota and in the Provinces of Manitoba and Saskatchewan. 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 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. A 16-page questionnaire was mailed to the firms during the summer of 1991. A reminder letter was sent to the firms in each state/province. In addition, follow-up telephone calls were made to the North Dakota firms that had not responded to the mailed survey and reminder letter (budget constraints made it infeasible to telephone the Canadian firms).

A total of 214 North Dakota firms returned useable surveys, which constituted a response rate of 58 percent 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. If the lists from the two provinces contained similar proportions of firms that were no longer in business or that served only local markets (compared to the experience in North Dakota), the effective response rate by the Canadian firms was about 11 percent.

Results

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, (6) future plans and needs for technical assistance.

General Characteristics

Most of the manufacturing establishments that responded to the survey were the only facility operated by the 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 percent) than were the North Dakota firms (13 percent). Firms that had been started since 1979 made up a large percentage of the respondents from both North Dakota (44 percent) and Canada (42 percent), but the percentage of relatively new firms was much lower in Manitoba vs. Saskatchewan (Table 1).

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 (Table 1). Slightly less than half of the North Dakota firms, but more than 60 percent of the Canadian firms, were engaged in research and development. Marketing research was an activity undertaken by about one-third of the respondents in each geographic area.

Durable goods manufacturers dominated the sample (Table 1), accounting for 65 percent in Manitoba, 66 percent in North Dakota, and 78 percent in Saskatchewan. Firms that fall into 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 in North Dakota, 20 percent in Manitoba, and 24 percent in Saskatchewan. Agribusiness firms made up about 24 percent of the sample in North Dakota and Saskatchewan but only 14.5 percent in Manitoba. Firms that had been established since 1987 made up 18.5 percent of the sample firms in North Dakota, about 11 percent in Saskatchewan, but only about 2 percent 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 percent of all firms in Manitoba and North Dakota and 73 percent in Saskatchewan.

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 percent of all firms, while Saskatchewan had the least, only 1.9 percent (Table 2). The median or midpoint value was $642,500 in North Dakota, $811,400 in Saskatchewan, and about $1.1 million in Manitoba. (Sales figures for all firms were converted to U.S. dollars for purposes of the analysis reported here.)

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	79.0	73.8	73.7	73.7
Headquarters of firm	13.1	23.0	19.3	21.2
Branch or regional office	7.9	3.3	7.0	5.1
Year firm started in this community				
1980 and after	43.8	25.4	58.9	41.7
1970-1979	25.4	22.1	25.0	23.5
1950-1969	18.4	22.0	9.0	15.7
1920-1949	6.9	18.6	0.0	9.5
Before 1920	5.5	11.9	7.1	9.6
Origin of company				
Started from scratch	78.5	71.7	82.8	77.1
Purchased	20.6	28.3	15.5	22.0
Inherited	1.0	0.0	1.7	0.9
Functions performed				
Assembly	73.7	67.2	76.0	71.3
Fabrication	68.7	75.9	78.0	76.9
Production design	67.6	63.8	82.0	72.2
Research and development	48.6	50.0	72.0	60.2
Marketing research	30.3	32.8	36.0	34.3
Feasibility studies	10.8	27.6	18.0	23.1
Type of product				
Durable goods	66.0	65.4	77.6	70.4
Nondurable goods	34.0	34.6	22.4	29.6
High-tech firms	10.9	23.6	20.0	20.0
Agribusiness firms	24.2	14.5	24.0	20.0
New firms since 1987	18.5	1.7	10.7	6.1
Firms established prior to 1987				
Less than 20 employees in 1987	59.5	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.

TABLE 2. 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	$9,160,922	$12,043,589	$1,404,730	$6,774,820
Median	642,500	1,140,351	811,403	949,123
	----------percent----------			
Distribution:				
Less than $100,000	15.6	0.0	11.5	5.7
$100,000 to 249,999	16.6	11.3	7.7	9.5
$250,000 to 499,999	12.2	5.7	23.1	14.3
$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 to 49,999,999	5.5	11.3	1.9	6.7
$50,000,000 or more	3.9	3.8	0.0	1.9
Change in gross sales, 1990 compared to 1989				
Mean	18.3	7.0	11.1	9.0
Median	10.0	5.0	0.0	4.0
Distribution:				
Negative	14.6	23.1	23.4	23.2
No change	22.2	21.2	29.8	25.3
0.01 to 9.9	11.4	19.3	4.2	12.1
10.0 to 24.9	26.0	26.9	19.2	23.2
25.0 to 49.9	15.8	5.7	10.6	8.1
50.0 to 99.9	6.9	1.9	8.4	5.1
100.0 or more	3.2	1.9	4.3	3.0

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

When the firms compared their 1990 gross sales with those for 1989, the North Dakota firms had fared somewhat better than their Canadian counterparts (Table 2). On average, the North Dakota firms reported an 18 percent increase in gross sales, Saskatchewan companies 11 percent, and Manitoba firms 7 percent. The median values, which are likely more representative of the typical firm, also indicated that North Dakota firms had more positive experiences.

When gross sales are compared for the different types of firms, Canadian durable goods manufacturers had larger gross sales on average than Canadian firms of other types (Appendix Table 1). The differences among median values are substantially less than the differences among means, however. When sales by firm type are compared between Canadian and U.S. firms, some differences can be noted (Appendix Table 2). Nondurable goods manufacturers in the U.S. had

higher sales than the average for all firms, but the opposite was true in Canada. Similarly, agribusiness firms in the U.S. had higher than average sales, but the Canadian agribusiness firms had average sales that were much less than the overall average.

When the changes in gross sales from 1989 to 1990 are examined, further contrasts can be noted (Appendix Tables 1 and 2). The Canadian durable goods firms recorded sales growth that was somewhat less than the average for all firms while sales growth for the durable goods firms in the U.S. was somewhat higher than the average for all firms. Agribusiness firms recorded a growth in sales that was much higher than average in Canada and somewhat higher in the U.S.

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 the local area (Table 3). The percentages of the firms' products or services that were sold to customers outside the state or province were quite similar among the three areas. About 47 percent of the Canadian firms reported selling some of their products to customers outside Canada, and about 84 percent 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.

When asked how successful they have been in developing new customers/market niches for existing products in the past year, most respondents in each province/state indicated that they had been successful or moderately successful.

When the destinations of their sales were compared for Canadian firms of different types, few major differences were found (Appendix Table 3). The only statistically significant difference was between the established firms with less than 20 employees and established firms with 20 or more workers. The smaller firms sold an average of 37 percent of their products outside the province whereas larger firms sold 56 percent outside the province, of which 13 percent were international sales.

A similar analysis of the destinations of sales for North Dakota firms also indicated that the larger, established firms (with 20 or more employees) had the higher levels of out-of-state sales (Appendix Table 4). New firms (established since 1987) had a somewhat higher average level of out-of-state sales than the small established firms (with less than 20 employees). Agribusiness firms and high-tech firms also had relatively high levels of out-of-state sales.

TABLE 3. 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	36.7	33.4	23.6	28.8
Within rest of state/province	21.4	21.1	35.1	27.7
Within rest of country	37.4	34.2	31.9	33.1
International	4.9	11.3	9.4	10.4
Percent of products sold out-of-state/province				
Mean	42.2	45.5	41.3	43.5
Median	30.0	45.0	40.0	43.0
Distribution:				
Zero	22.8	13.1	14.5	13.8
0.1 to 9.9	9.2	6.6	7.3	6.9
10.0 to 24.9	10.7	18.0	21.8	19.8
25.0 to 49.9	14.6	13.1	12.8	12.9
50.0 to 74.9	12.6	14.8	23.6	19.0
75.0 to 100.0	30.1	34.4	20.0	27.6
Degree of success in developing new customers/market niches				
Very successful	18.9	11.5	19.3	15.3
Successful	29.6	34.4	36.8	35.6
Moderately successful	29.1	32.8	26.3	29.7
Somewhat successful	17.5	16.4	15.8	16.1
Not successful	4.5	4.9	1.8	3.4

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

The respondents were asked about the importance of several factors in developing their out-of-state/province markets (Table 4). In each state/province, the most highly rated response was that company representatives had initiated contact with customers located outside the state/province, followed by the fact that the company's reputation had spread outside the state or province. (In Manitoba, these two responses received equal ratings.) Referrals were the third rated factor by respondents in each area. The ratings of the other three factors were much lower than those of the top three.

TABLE 4. RESPONDENTS' RATING OF IMPORTANCE OF SELECTED FACTORS IN DEVELOPMENT OF OUT-OF-STATE/PROVINCE MARKETS, 1991

Factors	North Dakota	Manitoba	Saskatchewan
	----------mean score*----------		
Acquired out-of-state sales prior to the company's founding	3.9	4.3	4.0
Initiated contact with out-of-state/ province customers	2.0	1.9	1.9
Reputation spread outside state/province	2.1	1.9	2.0
Referrals	2.4	2.3	2.2
Through acquisition of governmental contract	4.3	4.3	4.1
Through customer leaving state/province	4.2	4.3	4.0

*Mean score is based on a scale from 1 (critical) to 5 (unimportant).

When asked about the marketing strategies they had used to develop new customers and market niches, *improved product quality* was most highly rated by respondents in each state/province, followed by *added new product features and models* (Manitoba respondents gave the two strategies equal ratings) (Table 5). *Used new distribution channels* was the third-rated strategy for respondents in each province/state, followed by *targeted advertising*. Lowering prices was the least popular strategy for manufacturers in each area.

When asked about the factors which prevented them from pursuing new customers and/or market niches, Manitoba firms gave the highest rating to *cost*, followed by *marketing, labor, production capacity,* and failure to see an opportunity (Table 6). Saskatchewan and North Dakota respondents rated *marketing* as the most important factor, followed by *cost, labor, production capacity* (tied with *labor* in North Dakota), and failure to see an opportunity.

TABLE 5. MARKETING STRATEGIES USED BY RESPONDENT FIRMS TO DEVELOP NEW CUSTOMERS AND MARKET NICHES, 1991

Strategies	North Dakota	Manitoba	Saskatchewan
	----------mean score*----------		
Improved product quality	2.6	2.8	2.5
Added new product features and models	3.1	2.8	2.6
Used new distribution channels	3.6	3.6	3.5
Targeted advertising on product conviction and purchase	4.0	3.9	3.6
Lowered prices to attract customers	4.3	4.2	4.0

*Based on a scale from 1 (critical) to 5 (unimportant).

TABLE 6. FACTORS WHICH PREVENTED RESPONDENT FIRMS FROM PURSUING NEW CUSTOMERS AND/OR MARKET NICHES, NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN, 1991

Factors	North Dakota	Manitoba	Saskatchewan
	----------mean score*----------		
Cost	3.1	2.7	2.8
Marketing	3.0	2.9	2.6
Labor	3.8	3.9	3.8
Production capacity	3.8	4.2	4.4
Did not see an opportunity	4.4	4.5	4.6

*Based on a scale from 1 (critical) to 5 (unimportant).

Expenditures

The expenditures of the firms also were examined (Table 7). 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 substantially higher percentages of their raw materials from outside the country, while North Dakota firms were more likely to purchase these items from suppliers outside the state but within the country.

The distribution of expenditures for the Canadian firms and the percentage of expenditures made within the province are shown in Appendix Table 5. The high-tech firms had a lower percentage of their expenditures for labor and a higher percentage for subcontracting than the other types of firms. There were no significant differences for the other types of firms. A similar analysis for the North Dakota firms revealed statistically significant differences for nondurable goods manufacturers, for large (20 or more employees) established firms, for new firms, for agribusinesses, and for high-tech firms (Appendix Table 6).

Respondents were asked to rate the suppliers located within their province or state with respect to a number of attributes (Table 8). The suppliers received the most favorable ratings for quality of material delivered and on-time delivery. The least favorable responses concerned the availability of items, and the ratings were very similar in each of the provinces/state. The respondents also were asked whether they would make an effort to purchase from in-state/province suppliers if the items needed were available at a comparable price, and almost all responded affirmatively.

Employment

The typical (median) firm in Canada had 15 employees, which was the same as the number reported by the North Dakota firms (Table 9). In Manitoba and North Dakota, a few large firms had a substantial effect on the mean number of employees -- these values were 59 and 54 for Manitoba and North Dakota, respectively.

When the firms' employment was compared to the level 5 years previously, it was apparent that the North Dakota firms had achieved the greatest percentage and absolute growth. The average North Dakota firm had experienced a 44 percent increase in employment, compared to 22 percent for Saskatchewan companies and 13 percent for Manitoba firms.

TABLE 7. DISTRIBUTION OF EXPENDITURES BY RESPONDENT FIRMS, 1990

Expenditure Category	Percent of Total Expenditures	Location of Supplier			
		Within County	Rest of State/ Province	Rest of Nation	Outside Nation
		percent			
North Dakota					
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
Manitoba					
Raw materials	36.1	38.4	20.3	26.9	14.4
Processed materials	17.7	33.0	18.9	26.6	21.4
Labor	25.2	79.6	14.6	5.7	0.1
Subcontracting	6.8	61.4	22.8	10.0	5.8
Other	14.2	61.5	9.9	18.7	9.9
Saskatchewan					
Raw materials	34.1	34.2	22.0	36.1	7.7
Processed materials	19.1	46.3	12.7	28.0	13.0
Labor	29.1	79.2	19.0	1.9	0.0
Subcontracting	4.8	64.0	20.3	14.5	1.3
Other	12.9	75.8	8.3	12.5	3.3
Canada Total*					
Raw Materials	35.1	36.5	21.1	31.0	11.4
Processed materials	18.4	38.7	16.3	27.2	17.8
Labor	27.1	79.4	16.5	4.0	0.1
Subcontracting	5.8	62.4	21.9	11.6	4.1
Other	13.6	66.8	9.3	16.4	7.5

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

TABLE 8. RESPONDENTS' RATING OF SUPPLIERS WITHIN STATE/PROVINCE WITH RESPECT TO SELECTED ATTRIBUTES, 1991

Attribute	North Dakota	Manitoba	Saskatchewan
	mean score*		
On-time delivery	2.0	2.3	2.3
Quality of material delivered	2.0	2.2	2.2
Material cost	2.8	3.0	3.0
Transportation cost	2.6	3.0	3.0
Availability of items	2.9	3.0	3.1
Customer service	2.3	2.4	2.5

*Mean score is based on a scale from 1 (extremely good) to 5 (bad).

TABLE 9. 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	number	53.8	59.2	20.2	39.9
Median	number	15.0	14.5	15.0	15.0
Distribution:					
1- 5	percent	20.5	13.8	12.3	13.0
6-14	percent	27.3	36.2	33.3	34.8
15-24	percent	17.0	13.8	26.3	20.0
25-49	percent	13.6	15.5	21.1	18.3
50-99	percent	13.1	10.3	5.3	7.8
100 and over	percent	8.5	10.3	1.8	6.1
Total employment, five years ago					
Mean	number	37.3	52.4	16.5	35.1
Median	number	8.0	15.0	11.0	12.5
Distribution:					
1- 5	percent	29.6	23.2	23.5	23.4
6-14	percent	28.9	26.8	41.2	33.6
15-24	percent	13.4	10.7	17.6	14.0
25-49	percent	12.7	23.2	13.7	18.7
50-99	percent	8.5	5.4	2.0	3.7
100 and over	percent	7.0	10.7	2.0	6.5
Total employment, five years from now					
Mean	number	77.7	57.0	39.0	48.5
Median	number	26.0	22.0	26.0	24.0
Distribution:					
1- 5	percent	10.1	10.4	7.0	8.8
6-14	percent	18.9	10.4	20.9	15.4
15-24	percent	14.2	35.4	16.3	26.4
25-49	percent	24.3	22.9	39.5	30.8
50-99	percent	17.6	14.6	7.0	11.0
100 and over	percent	14.9	6.3	9.3	7.7

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

When asked to project their employment 5 years into the future, the Saskatchewan firms expected the largest percentage growth (93 percent), followed by those in North Dakota (44 percent). 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 percent from the 1991 level.

When the number of employees today was compared to the number 5 years ago, the average Canadian firm was found to have created 6.3 jobs over the past 5 years (Table 10) while the average North Dakota firm had created about 17 jobs (Table 11). About 27 percent of the Canadian firms reported that they had fewer employees at the time of the survey than 5 years previous, and 9 percent reported no change in the number employed. Comparable values for North Dakota manufacturers were 13 percent and 11 percent. About 44 percent 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.

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 groups, the larger established firms (in existence 5 years ago and with 20 or more employees at that time) had created substantially more jobs than their counterparts that had less than 20 employees 5 years ago, while new firms were intermediate between the 2 former groups in terms of the number of jobs created per firm. In both countries, the nondurable goods manufacturers had created substantially more jobs than their counterparts that produced durable goods. Canadian agribusinesses recorded substantially fewer new jobs than other firms, whereas agribusiness firms in North Dakota created more than 3 times as many jobs per firm as other companies. Similarly, the Canadian high-tech firms created fewer jobs per firm than other companies; in North Dakota the high-tech firms created more jobs than other companies.

The respondents also were asked about past and projected changes in employment for specific occupational groups (Table 12). 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.

TABLE 10. JOBS CREATED IN THE LAST FIVE YEARS BY CANADIAN* FIRMS OF DIFFERENT TYPES, 1991

Jobs Created in Last 5 Years	All Firms	Firm Type			Firm Type		Firm Type		Firm Type	
		New Firms	Established Firms		NonDurable Mfgrs	Durable Mfgrs	Agribusiness	Other	High-Tech	Other
			Less than 20 Employees	20 or More Employees						
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

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

**Significant difference at $\alpha = .05$ using Tukey Test.

TABLE 11. JOBS CREATED IN THE LAST FIVE YEARS BY NORTH DAKOTA FIRMS OF DIFFERENT TYPES, 1991

Jobs Created in Last 5 Years	All Firms	Firm Type			Firm Type		Firm Type		Firm Type	
		New Firms	Established Firms		NonDurable Mfgrs	Durable Mfgrs	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:	----------	----------	----------	----------	percent	----------	----------	----------	----------	----------
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 $\alpha = .05$ using Tukey Test.

TABLE 12. EMPLOYMENT BY OCCUPATIONAL CATEGORY AND PAST AND PROJECTED CHANGES FOR NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN MANUFACTURERS, 1991

Occupational Category	Current Employment		Percent Change	
	Avg. No. Per Firm	Percent	From Five Years Ago	Expected Five Years From Now
North Dakota				
Executive, administrative, and managerial	4.8	8.9	33.3	31.3
Professional specialty	3.6	6.7	44.0	44.4
Sales representatives	2.4	4.4	71.4	95.8
Clerical workers	4.3	8.0	38.7	30.2
Precision production, craft, and repair	9.3	17.2	66.1	40.9
Operators and fabricators	18.5	34.3	35.0	59.5
Laborers	10.9	20.2	84.7	31.2
Other	0.3	0.6	50.0	33.3
Total Employees Per Firm	54.1	100.3	44.3	44.4
Manitoba				
Executive, administrative and managerial	4.2	8.3	13.7	9.0
Professional specialty	2.2	4.4	39.0	20.8
Sales representatives	4.1	8.1	34.1	64.5
Clerical workers	4.4	8.7	35.8	5.5
Precision production, craft, and repair	5.9	11.7	1.7	11.0
Operators and fabricators	20.6	40.8	34.0	5.4
Laborers	7.9	15.6	31.3	10.0
Other	1.2	2.4	26.9	22.0
Total Employees Per Firm	50.5	100.0	29.2	9.3
Saskatchewan				
Executive, administrative and managerial	2.7	14.1	7.1	49.6
Professional specialty	1.3	6.8	47.8	83.5
Sales representatives	1.7	8.9	23.7	183.8
Clerical workers	1.5	7.8	25.2	38.9
Precision production, craft, and repair	3.7	19.3	24.0	105.1
Operators and fabricators	4.4	22.9	6.5	152.5
Laborers	3.3	17.2	12.3	73.8
Other	0.6	3.0	14.6	107.3
Total Employees Per Firm	19.2	100.0	18.2	100.0
Canada Total*				
Executive, administrative and managerial	3.5	9.9	11.3	23.4
Professional specialty	1.8	5.1	42.5	41.4
Sales representatives	2.9	8.2	30.7	96.9
Clerical workers	2.9	8.2	32.3	14.0
Precision production, craft, and repair	4.8	13.6	8.9	44.0
Operators and fabricators	12.6	35.6	27.2	30.7
Laborers	5.6	15.8	25.0	27.4
Other	1.3	3.6	22.0	50.1
Total Employees Per Firm	35.4	100.0	25.0	34.7

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

Financing

Most of the firms had sought financing during the last 12 months (Table 13). Only 20 percent of Manitoba companies, about 19 percent of Saskatchewan firms, and 35 percent of North Dakota manufacturers indicated that they had not sought financing. Working capital was the purpose for which credit was most often needed, followed by new equipment. Most firms had contacted only 1 financial institution, and few had contacted more than 2. About one-third of the manufacturers in Manitoba and North Dakota reported difficulty in obtaining financing, but 42 percent of those in Saskatchewan had such problems. When the frequency of financing problems was compared among firm types, there were few consistent patterns.

TABLE 13. NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN MANUFACTURERS' EFFORTS TO SECURE FINANCING IN THE LAST 12 MONTHS, 1991

Efforts to Secture Financing	North Dakota	Manitoba	Saskatchewan
	----------percent----------		
Total number of loans sought:			
None	35.4	20.0	18.9
One	23.9	34.0	28.3
Two	21.5	24.0	32.1
Three	12.0	16.0	7.5
Four or more	7.2	6.0	13.3
Tried to secure a loan for:			
New equipment	40.4	31.7	33.3
New building	15.9	11.9	5.3
Working capital	47.8	46.7	47.4
Overall business operation	30.4	29.3	31.6
Refinancing old debts	14.4	8.6	15.8
Number of financial institutions contacted:			
Mean	1.5	1.4	1.4
Distribution			
One	68.2	69.8	72.7
Two	20.9	23.3	20.5
Three	8.5	7.0	4.5
Four	2.3	0.0	2.3
Encountered difficulty in obtaining financing:			
All firms	32.2	31.1	42.2
Nondurable	24.0	20.0	55.6
Durable	36.6	28.6	43.3
New	52.6	0.0	40.0
Established (<20 employees)	27.1	34.8	42.4
Established (20/+ employees)	32.3	30.0	33.3
Agribusiness	48.4	60.0	50.0
High-tech	31.1	22.2	55.0

The firms that had encountered problems in obtaining financing were asked to rate several factors that could have been responsible. The *judgment of the financial institution* was the factor that received the highest rating by firms in each province/state (Table 14).

TABLE 14. BARRIERS TO OBTAINING FINANCING FOR NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN MANUFACTURERS, 1991

Factors	North Dakota	Manitoba	Saskatchewan
	----------mean score*----------		
Judgment of the financial institution	1.9	2.2	2.4
Operation of the financial institution	2.2	3.1	2.7
Business plan	2.9	3.4	2.8
Profit margin	2.5	2.5	2.6
Credit records	2.7	3.1	3.1
Problems in business operation	3.3	3.3	3.2

*Based on a scale from 1 (critical) to 5 (unimportant).

Commercial banks were the most commonly used credit source for manufacturers in each province/state (Table 15). Of the loans received by the survey firms, commercial banks were the source of 62 percent in North Dakota, 69 percent in Saskatchewan, and 90 percent in Manitoba.

Production Capacity

The manufacturers were asked what factors limit their production capacity (Table 16). *Finance* was the most important factor in each province/state.

The respondents also were asked about the extent to which their production capacity is currently utilized. The North Dakota producers reported the highest rates of capacity utilization with an average of 76 percent, followed by Manitoba firms (67 percent) and Saskatchewan companies (57 percent). Almost 46 percent of the Saskatchewan firms reported utilizing 50 percent or less of their production capacity, compared to 25 percent of North Dakota companies and 24 percent of Manitoba firms (Table 17).

TABLE 15. NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN MANUFACTURERS' INTERACTIONS WITH FINANCIAL INSTITUTIONS, 1990-1991

Financial Institution	Contacted for a Loan	Submitted Loan Application To	Received a Loan From	Degree of Cooperation Received
	----------number----------			mean score*
North Dakota				
Bank of North Dakota	31	19	16	3.1
Other banks	113	86	82	2.0
Small business administration	34	21	20	2.3
Government programs	17	11	10	2.7
Commercial investors	13	7	5	2.1
Manitoba				
Commercial banks	42	31	27	2.0
Federal or provincial agency	4	2	1	2.5
Government programs	7	6	2	3.6
Commercial investors	2	1	0	3.5
Saskatchewan				
Commercial banks	37	31	25	2.5
Federal or provincial agency	11	11	8	2.3
Government programs	7	6	2	3.1
Commercial investors	2	1	1	4.0

*Based on a scale from 1 (very cooperative) to 5 (not cooperative).

TABLE 16. FACTORS THAT LIMIT PRODUCTION CAPACITY FOR NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN MANUFACTURERS, 1991

Factors	North Dakota	Manitoba	Saskatchewan
	mean score*		
Finance	1.7	1.8	2.3
Personnel	2.4	2.6	2.8
Limited production equipment	2.3	2.6	2.6
Limited space	2.2	3.5	3.0
No desire to increase production	4.3	4.2	4.2

*Based on a scale from 1 (critical) to 5 (unimportant).

TABLE 17. UTILIZATION OF PRODUCTION CAPACITY BY NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN MANUFACTURERS, 1991

Production Capacity Utilization	North Dakota	Manitoba	Saskatchewan
	percent		
Percent of production capactiy currently in use:			
Mean	76.2	67.3	56.8
Distribution:			
50% or less	25.4	23.7	45.5
51% to 75%	20.9	44.1	30.9
76% to 95%	20.9	25.4	20.0
96% or more	32.8	6.8	3.6
Percent of capacity utilization compared to last year:			
Mean	7.1	-0.4	0.2
Distribution:			
Less than last year	3.9	23.5	11.4
0% (same as last year)	64.7	49.0	72.7
0.01% to 10%	13.8	11.8	6.8
11% to 30%	9.8	11.8	4.6
More than 30%	7.8	3.9	4.6
Percentage of current production capacity planned for use in two years from now:			
Mean	101.3	92.7	88.1
Distribution:			
80% or less	14.8	9.1	20.0
81% to 95%	18.0	36.4	40.0
96% to 110%	60.6	54.5	40.0
111% or more	6.6	0.0	0.0

When the firms compared the extent of their capacity utilization with the situation one year previous, the average response was one of virtually no change for the two provinces while North Dakota firms had increased utilization by 7 percent, on average (Table 17).

In each province/state the manufacturers planned to increase their capacity utilization substantially over the next two years (Table 17).

The manufacturers were asked to rate several attributes of their plant and equipment. There was relatively little variation in the scores, either among attributes or among the provinces/states (Table 18). Manufacturers in each area indicated a moderate level of satisfaction for each attribute.

TABLE 18. NORTH DAKOTA, MANITOBA, AND SASKATCHEWAN MANUFACTURERS' SATISFACTION WITH PLANT AND EQUIPMENT, 1991

Attribute	North Dakota	Manitoba	Saskatchewan
	----------mean score*----------		
Plant size	2.5	2.4	2.4
Plant age	2.3	2.5	2.2
Equipment size	2.5	2.3	2.3
Equipment age	2.7	2.5	2.4
Number of machines	2.7	2.5	2.5

*Mean score is based on a scale from 1 (very satisfied) to 5 (not satisfied).

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 change most frequently cited by respondents in each province/state (Table 19). 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.

TABLE 19. RESPONDENTS' PLANS FOR BUSINESS CHANGES IN THE NEXT TWO YEARS, 1991

Type of Change	North Dakota	Manitoba	Saskatchewan
	----------percent----------		
Increase market share	79.6	90.2	87.9
Market existing products to different customers	76.1	70.5	75.9
Increase production capacity	74.6	60.7	69.0
Add new product	66.7	70.0	82.8
Redesign product line:			
Market to new customers	41.3	41.0	41.4
Market to same customers	38.3	24.6	37.9
Diversify	26.4	29.5	37.9
Add new building	25.9	9.8	20.7
Add new branch	7.0	13.1	8.6
Relocate	7.0	15.3	5.2

The manufacturers also were asked about areas in which they might need worker training and educational assistance. Of the subject areas specified, *marketing and sales* was the topic that was rated as most important by the respondents in each province/state (Table 20). 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.

The ratings given to the various areas for worker training and educational assistance by Canadian firms of different types are shown in Appendix Table 7. *Marketing and sales* received the highest rating from each group of firms, and the same set of five subject areas was rated as the top five by all firm types except agribusinesses. Similar information for the North Dakota firms is shown in Appendix Table 8. Again, *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.

TABLE 20. 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	3.7	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	3.1	2.6
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).

When the manufacturers were asked about areas where they might perceive a need for technical assistance (consulting), *marketing studies* ranked first in North Dakota and second (tie) in both Manitoba and Saskatchewan (Table 21). The top ranked area for technical assistance for the Canadian firms was *developing international markets.* Other topics that received relatively high ratings were *research and development, process improvement,* and *quality assurance.*

When the technical assistance needs of Canadian firms were examined by firm type, *developing international markets* was the most highly rated topic for all groups except new firms, for which *marketing studies* were the top priority (Appendix Table 9). New firms also placed emphasis on *financial analysis/cost control.* Larger established firms placed more emphasis on *inventory control* than did other groups, and these firms, as well as agribusiness firms, placed a high priority on *material handling.*

TABLE 21. 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	4.1	4.3
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	2.9	2.4
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).

Among the North Dakota firms, *marketing studies* were the most highly rated subject area for durable goods manufacturers, for nondurable goods manufacturers, and for agribusiness firms (Appendix Table 10). New firms indicated that they were most interested in assistance in *developing international markets*, followed by *process improvement*. Large established firms 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

Economic development and diversification has become a high priority concern for state and provincial policy makers in the Upper Great Plains states and the Prairie Provinces, and the manufacturing sector is expected to play a major role in future development. In addition, the U.S.-Canada Free Trade Agreement may create both opportunities and challenges for manufacturers of specific types of goods. This study was undertaken to increase our understanding of the firms that comprise the manufacturing sector in North Dakota, Manitoba, and Saskatchewan. Information from 333 firms (214 in North Dakota, 61 from Manitoba, and 58 from Saskatchewan) constituted the data base for the analysis.

Many of the participating firms were relatively new; about 59 percent of the Saskatchewan companies and 44 percent of the North Dakota firms, but only 25 percent of the Manitoba manufacturers, had been established since 1979. Most of the respondents were engaged in producing durable goods (66 percent in North Dakota and 70 percent in the Canadian provinces).

Many of the firms also were quite small; about 57 percent of the North Dakota companies and 50 percent of those in Canada 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 change in sales reported by North Dakota firms was 18 percent compared to 9 percent for Canadian companies.

The Canadian firms were more oriented to international marketing and sales than their North Dakota counterparts. About 47 percent 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 percent plan to serve international markets within 5 years (compared to one-half of the North Dakota firms).

The typical (median) firm in North Dakota had 15 employees, which was the same value reported by the Canadian firms. However, the North Dakota companies had achieved a much greater increase in their employment over the past 5 years, 44 percent compared to 14 percent for Canadian 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 percent utilization, followed by Manitoba (67 percent) and Saskatchewan (57 percent) companies.

When asked about areas where they saw a need for technical assistance (consulting) and for training and educational assistance, the Canadian firms tended to place a higher priority on developing international markets, although their priorities were similar to those of their North Dakota counterparts in other respects.

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 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.

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.

Bergman, Edward M. 1990. "State Innovation Policies and Regional Restructuring of Technologically Dependent Industry." In *Growth Policy in the Age of High Technology*, J. Schmandt and R. Wilson, eds., Winchester, MA: Unwin Hyman, Inc., pp. 127-145.

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 K. 1988. *The Rise of the Entrepreneurial State.* Madison: The University of Wisconsin Press.

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.

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.

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, and Janet K. Wanzek. 1992. *North Dakota Manufacturers: Attributes and Needs Assessment.* Agr. Econ. Rpt. No. 279. Fargo: North Dakota State University.

Pulver, Glen C. 1989. "Developing a Community Perspective on Rural Economic Development." *Journal of the Community Development Society* 20(2): 1-14.

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

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.

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

APPENDIX

APPENDIX TABLE 1. GROSS SALES OF RESPONDENT CANADIAN* MANUFACTURING FACILITIES, BY FIRM TYPE

Gross Sales	All Firms	Durable Goods Manufacturers	Nondurable Goods Manufacturers	Agribusiness Firms	High-Tech Firms
Gross sales in 1990					
Mean	$6,774,820	7,369,281	4,971,903	1,671,305	2,241,542
Median	949,123	877,193	877,193	1,271,930	877,193
Change in gross sales, 1990 compared to 1989	----------percent----------				
Mean	9.0	7.9	14.4	19.0	5.9
Median	4.0	0.0	10.0	7.5	10.0

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

APPENDIX TABLE 2. GROSS SALES OF RESPONDENT NORTH DAKOTA MANUFACTURING FACILITIES, BY FIRM TYPE

Gross Sales	All Firms	Durable Goods Manufacturers	Nondurable Goods Manufacturers	Agribusiness Firms	High-Tech Firms
Gross sales in 1990					
Mean (N=180)	$9,160,922	6,438,514	15,631,356	32,636,350[a]	3,189,845
Median	642,500	588,500	875,000	1,500,000	1,500,000
Change in gross sales, 1990 compared to 1989	----------percent----------				
Mean (N=158)	18.3	21.7	11.8	22.5	20.6
Median	10.0	10.0	5.0	10.0	12.5

[a]Agribusiness firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

APPENDIX TABLE 3. MARKETS AND MARKETING OF CANADIAN* FIRMS, BY FIRM TYPE, 1991

Subject Area	All Firms	Durable Goods Manufacturers	Nondurable Goods Manufacturers	New Firms	Established Firms: Less than 20 Employees	Established Firms: 20 Employees or More	Agribusiness Firms	High-Tech Firms
	percent							
Number	116	66	29	7	73	32	20	20
Where major products are marketed								
Within local market	28.8	27.7	27.5	38.9	30.6	24.0	24.2	17.3
Within rest of province	27.7	27.9	25.5	17.1	32.1	20.2	20.4	28.3
Within rest of country	33.1	30.8	40.5	37.9	28.6	42.5	41.3	40.9
International	10.4	13.6	6.5	6.1	8.7	13.3	14.1	13.5
Percent of products sold out-of-state								
Mean	43.5	44.4	47.0	43.4	37.3[a]	55.8[a]	55.3	54.6
Median	43.0	40.0	50.0	50.0	20.0	55.0	67.5	60.5

[a]Established firms with less than 20 employees significantly different than established firms with 20 or more employees based on the Tukey test using $\alpha = .05$.

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

APPENDIX TABLE 4. MARKETS AND MARKETING OF NORTH DAKOTA FIRMS, BY FIRM TYPE, 1991

Subject Area	All Firms	Durable Goods Manufacturers	Nondurable Goods Manufacturers	New Firms	Established Firms: Less than 20 Employees	Established Firms: 20 Employees or More	Agribusiness Firms	High-Tech Firms
	percent							
Where major products are marketed								
Within local market	36.7	33.6	40.4	20.4	45.5[a]	21.1[a]	16.4[c]	15.0[d]
Within rest of North Dakota	21.4	23.7	17.9	22.3[b]	22.8[b]	17.3	24.5	26.6
Within rest of United States	37.4	37.6	36.7	51.4[b]	27.9[a,b]	54.7[a]	49.6[c]	52.8[d]
International	4.9	5.1	4.6	5.3	3.7	6.9	9.5[c]	4.7
Percent of products sold out-of-state								
Mean (N=206)	42.2	42.7	41.3	46.7	31.6[a]	61.6[a]	59.1[c]	57.5[d]
Median	30.0	35.0	30.0	57.5[b]	20.0[a,b]	68.0[a]	52.5	68.0

[a]Established firms with less than 20 employees significantly different than established firms with 20 or more employees based on the Tukey test using $\alpha = .05$.

[b]New firms significantly different than established firms with less than 20 employees based on the Tukey test using $\alpha = .05$.

[c]Agribusiness firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

[d]High-tech firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

APPENDIX TABLE 5. DISTRIBUTION OF EXPENDITURES BY CANADIAN* FIRMS, BY FIRM TYPE, 1990

Firm Type	Materials		Expenditure Category			Total
	Raw	Processed	Labor	Subcontracting	Other	
All firms						
Percent of total expenditures	35.5	18.9	27.4	5.9	12.3	100.0
Percent made within province	57.6	55.0	96.0	84.2	72.4	61.7
Nondurable manufacturers						
Percent of total expenditures	38.9	12.5	27.2	9.8	11.6	100.0
Percent made within province	50.0	49.6	99.9	76.7	66.3	59.4
Durable manufacturers						
Percent of total expenditures	36.1	20.2	25.4	4.2	14.1	100.0
Percent made within province	60.8	60.8	98.3	88.9	81.2	62.7
New firms						
Percent of total expenditures	31.5	20.0	31.5	0.0	17.0	100.0
Percent made within province	40.0	43.3	100.0	100.0	100.0	57.5
Firms with less than 20 employees						
Percent of total expenditures	37.0	18.7	26.4	6.9	11.0	100.0
Percent made within province	63.0	62.2	95.3	82.1	73.3	62.1
Firms with 20 employees or more						
Percent of total expenditures	33.6	19.7	27.7	4.0	15.0	100.0
Percent made within province	49.8	41.1	96.2	85.4	74.5	58.0
Agribusiness firms						
Percent of total expenditures	47.1	12.7	21.8	5.5	12.9	100.0
Percent made within province	71.2	75.1	100.0	95.3	87.5	68.9
High-tech firms						
Percent of total expenditures	44.3	15.5	16.8[a]	14.4[a]	9.0[a]	100.0
Percent made within province	42.2	49.8	100.0	70.5	75.0	51.0

[a]High-tech firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

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

APPENDIX TABLE 6. DISTRIBUTION OF EXPENDITURES BY NORTH DAKOTA FIRMS, BY FIRM TYPE, 1990

Firm Type	Materials		Expenditure Category			Total
	Raw	Processed	Labor	Subcontracting	Other	
All firms						
Percent of total expenditures	30.3	21.9	27.4	4.7	15.7	100.0
Percent made within state	43.3	34.2	97.8	74.6	80.5	54.9
Nondurable manufacturers						
Percent of total expenditures	34.5	19.6	22.5	6.7	16.7	100.0
Percent made within state	53.0[a]	36.9	98.0	65.1	73.7	60.6
Durable manufacturers						
Percent of total expenditures	28.2	22.9	29.7[a]	3.9	15.3	100.0
Percent made within state	37.2[a]	32.5	97.7	78.7	84.0	52.2
New firms						
Percent of total expenditures	19.1	30.4	28.3	21.6[c,d]	0.6[c]	100.0
Percent made within state	38.9	29.7	94.8	91.7	97.5	69.2[c]
Firms with less than 20 employees						
Percent of total expenditures	30.7	22.5	28.4	3.1[d]	15.3	100.0
Percent made within state	48.6[b]	36.9	98.6	77.1	82.5	57.0
Firms with 20 employees or more						
Percent of total expenditures	33.8	17.9	23.8	3.6[c]	20.9[c]	100.0
Percent made within state	25.9[b]	23.8	97.3	69.2	69.9	47.0[c]
Agribusiness firms						
Percent of total expenditures	41.3[e]	23.0	17.0[d,e]	4.9	13.8	100.0
Percent made within state	55.0[e]	30.0	97.2	67.3	76.5	57.1
High-tech firms						
Percent of total expenditures	23.3	28.8	22.8	8.6	16.5	100.0
Percent made within state	13.8[e,f]	18.8	98.1	91.0	87.5	42.0[f]

[a]Nondurable manufacturers significantly different than durable manufacturers based on the Tukey test using $\alpha = .05$.

[b]Established firms with less than 20 employees significantly different than established firms with 20 or more employees based on the Tukey test using $\alpha = .05$.

[c]New firms significantly different than established firms with 20 or more employees based on the Tukey test using $\alpha = .05$.

[d]New firms significantly different than established firms with less than 20 employees based on the Tukey test using $\alpha = .05$.

[e]Agribusiness firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

[f]High-tech firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

APPENDIX TABLE 7. TRAINING AND EDUCATIONAL ASSISTANCE NEEDS BY FIRM TYPE FOR CANADIAN* MANUFACTURERS, 1991

Subject Area	All Firms	Durable Goods Manufacturers	Nondurable Goods Manufacturers	New Firms	Established Firms: Less than 20 Employees	Established Firms: 20 Employees or More	Agribusiness Firms	High-Tech Firms
				mean scores**				
Operator training	3.58	3.51	3.76	3.80	3.79	3.12	3.31	3.33
Computer-aided design	3.80	3.83	4.00	3.60	3.85	3.63	3.50	3.87
Basic computer skills	3.38	3.45	3.24	3.50	3.40	3.38	3.43	3.29
Computer-aided mfg.	3.92	4.16	3.71	4.00	4.00	3.64	3.92	3.93
Quality control	2.96	2.98	3.00	2.80	3.02	2.81	2.80	2.75
Management training	2.97	3.11	2.77	2.50	3.10	2.77	2.33[a]	3.13
Marketing and sales	2.53	2.67	2.39	1.60	2.52	2.62	2.20	2.44
Exporting	2.87	2.91	2.78	2.20	2.88	2.93	2.53	2.56
Quality assurance	2.98	3.04	3.05	2.50	3.16	2.65	2.87	2.69
Financing	3.35	3.37	3.24	3.25	3.33	3.35	2.79	3.31
Labor relations	3.81	3.94	3.75	4.25	3.87	3.67	3.50	3.71

[a]Agribusiness firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

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

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

APPENDIX TABLE 8. TRAINING AND EDUCATIONAL ASSISTANCE NEEDS BY FIRM TYPE FOR NORTH DAKOTA MANUFACTURERS, 1991

Subject Area	All Firms	Durable Goods Manufacturers	Nondurable Goods Manufacturers	New Firms	Established Firms: Less than 20 Employees	Established Firms: 20 Employees or More	Agribusiness Firms	High-Tech Firms
	mean scores*							
Operator training	3.36	3.45	3.16	3.33	3.50	3.14	3.21	3.43
Computer-aided design	3.65	3.53	3.87	3.80	3.70	3.41	3.55	3.14
Basic computer skills	3.39	3.46	3.24	3.81[a]	3.41	2.95[a]	3.33	3.60
Computer-aided mfg.	3.78	3.70	3.93	4.00	3.93	3.36	3.65	3.29
Quality control	3.08	3.10	3.00	3.45	3.21	2.65	2.79	3.00
Management training	3.11	3.21	2.92	3.53[a]	3.29[b]	2.56[a,b]	3.03	3.00
Marketing and sales	2.66	2.66	2.67	2.70	2.71	2.53	2.58	2.94
Exporting	3.60	3.48	3.83	2.86[c]	3.79[c]	3.61	2.97[d]	3.77
Quality assurance	3.07	3.15	2.90	2.86	3.30	2.69	2.63[d]	3.42
Financing	3.23	3.27	3.13	2.68	3.33	3.26	2.71[d]	3.62
Labor relations	3.41	3.37	3.46	3.15	3.67	3.11	3.18	3.36

[a]New firms significantly different than established firms with 20 or more employees based on the Tukey test using $\alpha = .05$.

[b]Established firms with less than 20 employees significantly different than established firms with 20 or more employees based on the Tukey test using $\alpha = .05$.

[c]New firms significantly different than established firms with less than 20 employees based on the Tukey test using $\alpha = .05$.

[d]Agribusiness firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

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

APPENDIX TABLE 9. CANADIAN* MANUFACTURERS' TECHNICAL ASSISTANCE (CONSULTING) NEEDS BY SUBJECT AREA AND FIRM TYPE, 1991

Subject Area	All Firms	Durable Goods Manufacturers	Nondurable Goods Manufacturers	New Firms	Established Firms: Less than 20 Employees	Established Firms: 20 Employees or More	Agribusiness Firms	High-Tech Firms
	mean scores**							
Accounting and records	3.99	4.02	4.08	4.00	3.86	4.21	4.12	3.83
Human resource management	3.97	3.98	3.95	4.00	3.93	4.04	3.88	3.88
Financial analysis/ cost control	3.42	3.27	3.87	2.67	3.42	3.54	3.44	3.59
Computer system	3.51	3.56	3.42	3.83	3.53	3.38	3.59	3.35
Inventory control	3.51	3.48	3.59	4.00	3.68[a]	3.00[a]	3.41	3.31
Plant layout and design	3.82	3.94	3.65	3.17	3.98	3.52	3.71	3.35
Production control	3.44	3.41	3.38	3.17	3.54	3.21	3.28	3.00
Research and development	3.28	3.34	2.80	3.00	3.31	3.29	2.94	3.00
Marketing studies	2.94	3.02	2.58	2.50	2.89	3.10	2.81	2.61
Strategic planning design	3.44	3.42	3.41	3.00	3.52	3.33	3.19	3.25
Process improvement	3.38	3.36	3.17	3.17	3.52	3.14	3.17	3.18
Material handling	3.61	3.67	3.36	3.33	3.89[a]	3.03[a]	3.00[b]	3.88
Industrial waste management	4.18	4.07	4.41	4.83	4.23	3.96	4.33	4.38
Prototype testing	3.87	3.77	4.00	3.50	4.02	3.61	3.41	4.06
Product-process development	3.55	3.63	3.17	3.33	3.65	3.41	3.56	3.53
Product and process commercialization	3.62	3.66	3.50	3.60	3.66	3.58	3.56	3.73
Developing international markets	2.68	2.67	2.39	3.00	2.59	2.77	2.33	2.21
Government/manufacturing specification	3.66	3.64	3.68	3.83	3.60	3.75	3.71	3.17
Quality assurance	2.92	2.80	2.91	3.00	2.94	2.90	2.94	2.81

[a]Established firms with less than 20 employees significantly different than established firms with 20 or more employees based on the Tukey test using $\alpha = .05$.

[b]Agribusiness firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

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

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

APPENDIX TABLE 10. NORTH DAKOTA MANUFACTURERS' TECHNICAL ASSISTANCE (CONSULTING) NEEDS BY SUBJECT AREA AND FIRM TYPE, 1991

Subject Area	All Firms	Durable Goods Manufacturers	Nondurable Goods Manufacturers	New Firms	Established Firms: Less than 20 Employees	Established Firms: 20 Employees or More	Agribusiness Firms	High-Tech Firms
	mean scores*							
Accounting and records	3.71	3.75	3.61	3.52	3.66	4.05	4.00	3.83
Human resource management	3.69	3.67	3.69	3.96	3.69	3.38	3.67	3.47
Financial analysis/ cost control	3.39	3.45	3.27	3.38	3.43	3.44	3.62	3.44
Computer system	3.32	3.35	3.20	3.52	3.37	3.00	3.13	3.50
Inventory control	3.32	3.39	3.18	3.48	3.43	3.02	3.41	2.89
Plant layout and design	3.66	3.60	3.83	3.81	3.69	3.53	3.71	3.61
Production control	3.37	3.33	3.43	3.56	3.47	2.98	3.50	3.16
Research and development	3.38	3.33	3.54	3.04	3.54	3.15	3.08	3.61
Marketing studies	2.92	2.91	2.97	3.04	2.93	2.88	2.57[d]	3.05
Strategic planning design	3.43	3.48	3.32	3.58	3.46	3.18	3.21	3.56
Process improvement	3.20	3.19	3.22	2.89	3.43[a]	2.80[a]	2.95	2.89
Material handling	3.51	3.48	3.62	3.37	3.70	3.33	3.63	3.33
Industrial waste management	3.75	3.76	3.77	4.04[b]	3.94[a]	3.20[a,b]	3.75	4.06
Prototype testing	3.97	3.91	4.08	3.63	4.12	3.78	3.71	3.79
Product-process development	3.63	3.63	3.62	3.26	3.86	3.35	3.35	3.56
Product and process commercialization	3.78	3.74	3.84	3.56	3.90	3.65	3.64	4.00
Developing international markets	3.47	3.39	3.57	2.63[b,c]	3.63[c]	3.53[b]	2.83[d]	3.58
Government/manufacturing specification	3.68	3.63	3.86	3.33	3.72	3.95	3.48	3.89
Quality assurance	3.00	3.00	2.98	3.07	3.08	2.83	2.98	3.39

[a]Established firms with less than 20 employees significantly different than established firms with 20 or more employees based on the Tukey test using $\alpha = .05$.

[b]New firms significantly different than established firms with 20 or more employees based on the Tukey test using $\alpha = .05$.

[c]New firms significantly different than established firms with less than 20 employees based on the Tukey test using $\alpha = .05$.

[d]Agribusiness firms significantly different than other firms based on the Tukey test using $\alpha = .05$.

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