

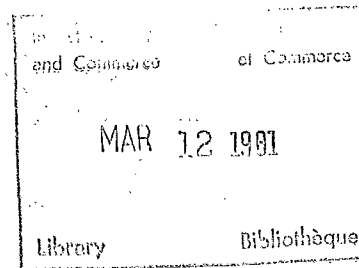
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POLICY ANALYSIS BRANCH
OCCASIONAL STAFF PAPER #1
"An Analysis of Regional
Productivity Variations in
Canadian Manufacturing
Industries"

Industry, Trade and Commerce



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"An Analysis of Regional
Productivity Variations in
Canadian Manufacturing
Industries"

Marcel D. Bélanger
Ken Peake
Policy Analysis
December 20, 1976

This will be the first in a series of "Occasional Papers" making available to a broader audience, work undertaken in Policy and Economic Analysis.

Any comments on the content of each paper would be gratefully appreciated and may be directed to the author.

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ANALYSIS OF REGIONAL PRODUCTIVITY VARIATIONS IN CANADIAN MANUFACTURINGINTRODUCTION

An in-depth analysis of productivity and competitiveness in the Canadian economy and the factors behind it, with particular emphasis on the manufacturing sector was carried out recently by this office. Although the paper which was presented contained regional data on manufacturing productivity and some interpretation thereof, it became apparent that the striking productivity differences between the regions of Canada and the factors contributing thereto required much closer examination to permit a meaningful assessment of the productivity performance and thus lead to recommendations to improve the productivity performance in all areas of Canada.

Therefore, the first part of this paper will attempt to present a more thorough analysis and an evaluation of the productivity performance of manufacturing industries in the various regions of Canada. Part II will examine, on a comparative regional basis, the major factors contributing to productivity variations, while Part III will serve to assess the possibilities and scope for productivity improvement in each region of Canada. Some conclusions emanating from this analysis will be presented in the last section of the paper.

I COMPARATIVE REGIONAL PRODUCTIVITY PERFORMANCE

A brief examination of the recent regional productivity trends from 1967 to 1973 as well as a cross-sectional analysis of the productivity performance in 1972 in major manufacturing sectors in the regions of Canada is provided below. It should be noted at the outset that because of confidentiality, data on a provincial basis was not available for the Atlantic provinces. Therefore, basic and derived data for these provinces was aggregated and presented for the region as a whole. Data on other regions was sufficiently disaggregated to carry out the analysis on a provincial basis.

A) Productivity Trends

Manufacturing productivity measured in terms of output per production worker has shown variations between provinces of Canada both in the rates of productivity growth achieved and in the levels of productivity.

Turning first to the productivity growth rates in manufacturing during the period 1967-1973, the following table shows that the highest average annual productivity growth rates in terms of output per production worker were registered in the Atlantic region, British Columbia and Saskatchewan. It should be noted that the average annual growth rates in all provinces and also in the Atlantic region were substantially higher during the period 1970 to 1973 compared to the period 1967 to 1973.

TABLE I

Average Annual Rates of Increase of Value Added
(Total Activity) per Production Worker, by Province/Atlantic Region
(1967 - 1973)

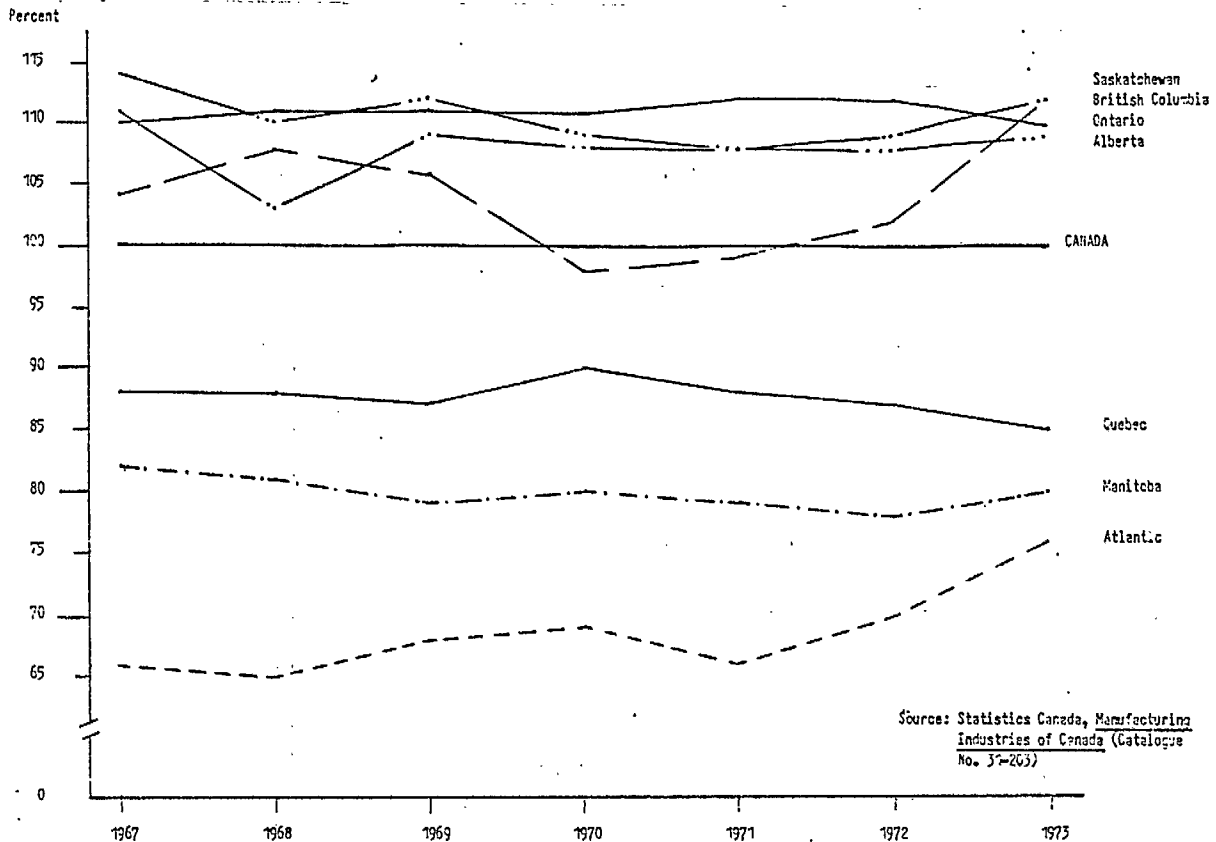
<u>Provinces/Atlantic Regions</u>	<u>1967-1973</u> %	<u>1970-1973</u> %
Atlantic	10.17	12.77
Quebec	7.00	7.57
Ontario	7.71	9.34
Manitoba	7.22	9.27
Saskatchewan	7.96	10.96
Alberta	6.88	9.70
British Columbia	9.03	14.61
C a n a d a	7.71	9.53

SOURCE: Statistics Canada, Manufacturing Industries of Canada, (Cat. 31-203).

Average annual growth rates for 1970-73 by major manufacturing sectors and by province and for the Atlantic region is contained in Appendix "A". Of importance are the high average annual growth rates achieved in wood products industries in all provinces, in particular Saskatchewan (36%); British Columbia (29%); Alberta (24%) and the Atlantic region (22%). Petroleum and coal products industries have also shown a relatively high growth rate in most provinces while machinery industries have shown relatively low annual growth rates in all provinces including Ontario where the annual growth rate of production in that sector was - 3.7% during that period.

Perhaps more indicative of manufacturing productivity performance over time than annual growth rates were the levels of productivity achieved in each province of Canada during the period 1967 to 1973. The level of provincial manufacturing labour productivity for that period in relation to the Canadian average level, is shown in Chart I.

CHART I
Output per Production Worker in Canadian Manufacturing -
by Province and Atlantic Region
1967 - 1973



During the period 1967 to 1973, Ontario, Alberta, Saskatchewan and British Columbia generally maintained a level of labour productivity in excess of the Canadian average although British Columbia was less consistent. Whereas in 1970 and 1971, total manufacturing output per production worker was slightly below the Canadian average, in 1972 and 1973, B.C.'s output per production worker was one of the highest achieved in Canada, largely as a result of substantial increases in performance in wood and in paper and allied industries.

In Saskatchewan, wood industries also recorded large increases in labour productivity in 1972 and 1973 but this increase represented only 8% of total manufacturing employment and 7% of total shipments. More important in maintaining relatively high labour productivity levels in Saskatchewan during the period 1967 to 1973 were the gradual increases in productivity in the food and beverage industries. This industrial sector represented 39% of total manufacturing employment and nearly 50% of total manufacturing shipments in 1972.

The productivity recorded by Quebec, Manitoba, and the Atlantic provinces was below the Canadian average level. Quebec's productivity was approximately 10% lower than the average Canadian level in 1970 and fell to roughly 15% below the Canadian level in 1973 whereas the Manitoba level remained relatively constant at 20% below the Canadian average. Quebec's relatively low performance can be attributed to relatively lower levels of productivity in a number of manufacturing industries. On average, from 1970-1973, the Atlantic region had an increase in overall productivity levels. The available data for the region does demonstrate some notable improvements in productivity levels in particular in the food and beverage and wood products industries.

B) Cross-Sectional Analysis of Productivity Performance

In order to assess the performance in each major industry by sector and by Province, a cross-sectional analysis of productivity for 1972 was carried out.

The following table summarizes the productivity performance in terms of output per unit of labour, output per unit of capital and output per unit of combined labour and capital inputs. Comparative productivity figures by province, using these three measures for each of the twenty major manufacturing sectors where data was available, are presented in Appendices "B" to "E" inclusive.

TABLE II
Comparison Of
Provincial Productivity Performance in Canadian Manufacturing - 1972

	<u>Value Added</u> <u>(Total Activity)</u>		<u>Value Added</u> <u>(Total Activity)</u>		<u>Value Added</u> <u>(Total Activity)</u>	
	<u>Employee</u>	<u>Rank</u>	<u>Capital</u>	<u>Rank</u>	<u>Combined Labour and Capital</u>	<u>Rank</u>
	\$		\$		\$	
Atlantic Region	11,490	7	30,777	7	8,366	7
Quebec	13,470	5	49,694	2	10,598	5
Ontario	17,021	1	51,213	1	12,775	1
Manitoba	12,327	6	38,120	3	9,315	6
Saskatchewan	16,260	3	32,775	5	10,868	4
Alberta	16,204	4	35,471	4	11,123	2
British Columbia	16,455	2	32,676	6	10,944	3
C a n a d a	15,441		44,324		11,451	

Regardless of the productivity measure employed, the Atlantic region recorded the lowest level of total manufacturing productivity in 1972. Manitoba and Quebec also recorded relatively lower labour productivity levels measured in terms of value added per employee and also in terms of combined units of labour and capital. Value added per unit of capital, however, was relatively high in Quebec and Manitoba which reflects the small amounts of capital used in these provinces in a number of industries.

More striking than the divergence in productivity levels in overall manufacturing productivity among provinces in 1972 was the different productivity performances in similar industries between the various geographic areas.

For example, the rubber products industries in the Atlantic region fared relatively poorly with a level of labour productivity measured in terms of value added per employee of some 60% below the Canadian level while machinery industries were approximately 55% below the Canadian productivity average in that sector. Conversely, productivity measured on the same basis was high in Saskatchewan while machinery industries in Alberta showed high labour productivity performance in 1972.

Further, whereas the level of labour productivity in the Atlantic region was some 17% below the Canadian average in the non-metallic mineral industries, Manitoba's productivity in that sector was almost 52% above the Canadian level. This was Manitoba's best performance and also the highest level of productivity achieved in all geographic areas in the non-metallic minerals sector. This industry however represented only 3% of total manufacturing employment and some 4% of total shipments. As was the case in the Atlantic region, productivity in the rubber products industry in Manitoba was below the Canadian average but again its importance, in terms of employment and shipments, was negligible.

Quebec ranked third lowest in terms of overall level of labour productivity and combined labour and capital productivity in 1972, ahead of the Atlantic region and Manitoba. The level of output per employee was below that recorded for Canada in eighteen of twenty major manufacturing sectors, petroleum and coal and electrical products industries being the only exceptions. In the former industry, Quebec attained the highest level of output per employee of all of the geographic areas. The weakest performers in terms of labour productivity in this province were transport equipment and wood products. But in terms of importance, these industries represented respectively only 6% and 4% of total manufacturing shipments and the same percentages in terms of employment. The relatively poor performance of Quebec in the transportation industries, as in most other provinces for that matter, was a reflection of the high productivity levels attained by Ontario in that industry. The level of capital productivity, however, presented a different case for this province. Quebec's overall level of capital productivity was above that of Canada and second only to Ontario. Further, in sixteen of the twenty major industry sectors, the levels of capital productivity in Quebec exceeded that of Canada. For example, wood products, which was one of the weakest performers in terms of labour productivity, showed a level of capital productivity which exceeded the Canadian average by roughly 55%. The relatively high value added per unit of capital stock ratios reflects the labour intensive types of industries in Quebec.

Overall, Saskatchewan and Alberta were more or less equal in their labour productivity performances, although Alberta did slightly better in terms of capital productivity. In eight of the twelve major manufacturing sectors for which data was available for both of these provinces, the levels of labour productivity were either both above or below the Canadian average, that is both provinces tended to do well or poorly in the same industries. The best performer in Saskatchewan, in terms of labour productivity was the wood products industry at approximately 41% above the Canadian average. This industry represented 8% of total manufacturing shipments in 1972 and 7% of total employment. Alberta attained an equal percentage above the Canadian level of labour productivity in the petroleum and coal industry. While this industry represented only 2% of employment in manufacturing in 1972, it represented over 9% of total manufacturing shipments. Saskatchewan was also a relatively strong performer in that industry while at the other end of the spectrum, the level of labour productivity recorded in the transportation equipment industries was significantly below the Canadian level. In terms of capital productivity, however, this industry was over 80% above Canada as a whole. The lowest performance in terms of labour productivity in Saskatchewan was experienced in the furniture and fixture industries sector, at roughly 30% below the Canadian average, but its importance in terms of employment and shipments was negligible.

The above analysis demonstrated the marked differences in productivity growth rates and in the levels of productivity between provinces. Perhaps more significant were the substantial variations in the levels of productivity in the same industries among the various provinces.

In searching for ways and means to improve productivity in provincial industries, it must be recognized that each province or region generally possesses varying social and economic circumstances e.g. different natural resources, a diverse industrial structure and manpower base, etc. The overriding concern should thus be to attempt to raise manufacturing productivity levels in all regions of Canada, especially in those industries which, because of their importance in terms of value of shipments and employment creation and in upgrading available natural resources, are of key importance to these regions. Further, it would appear that attempts to raise productivity levels in industry sectors so as to match those achieved in other provinces in similar industries, without taking into account the industrial strengths and weaknesses of each province and also the provincial aspirations in terms of industrial development, would reap few tangible benefits in the long term.

II COMPARISON OF MAJOR FACTORS CONTRIBUTING TO REGIONAL DISPARITIES

In past and current literature on the subject of regional economic disparities, a number of factors including plant size, product diversification, capital intensity, education and management and the rate of technological diffusion have been identified as major causes for the deepseated and prolonged differentials in productivity among the regions of Canada. Before attempting to outline the possibilities which might exist for productivity improvements in specific areas of manufacturing in the regions, the following sections will serve to analyse and evaluate the importance of these factors in explaining regional variations in productivity.

1. Size of Establishments and Product Diversification

An argument often heard suggests that productivity in manufacturing sectors varies among the provinces within a given industry due to differences in plant sizes. In particular, those provinces harbouring larger plants reap the benefits of economies of scale and these economies are reflected in higher levels of productivity performance. The argument is somewhat corroborated by the data in Table III which demonstrates that productivity, as measured in terms of value added per employee, in 1973, was generally higher in larger size plants. However, this was not a hard and fast rule as in some Provinces, large scale plants showed a lower relative productivity.

Cross-tabulations of output per employee, by size of establishment, by province for 1973 are provided in Appendix "F". The predominant fact emerging from this data was that nearly 80% of all establishments in Canada had fifty employees or less. The proportion of establishments with less than 50 employees ranged from 89% in PEI and Saskatchewan to 74% in Newfoundland.

The following salient points emanate from the data in Table III and Appendix "F".

In Prince Edward Island, establishments employing one hundred to five hundred employees showed a relatively high productivity (\$18,159 in 1973, above the Canadian average for that category). These establishments, however, formed only .8% of the total number of establishments operating in this province.

In Nova Scotia, the average productivity achieved in 1973 in firms employing 1-4 people at \$16,054 was considerably higher than the Canadian average of \$12,789. The higher productivity achieved by very small firms in Nova Scotia is difficult to explain. It should be noted however that these establishments accounted for only 1.4 per cent of employment in manufacturing in that province.

TABLE III

VALUE ADDED (TOTAL ACTIVITY) PER EMPLOYEE IN CANADIAN MANUFACTURING,
BY SIZE ESTABLISHMENT AND BY PROVINCE - 1973

	<u>Nfld.</u>	<u>P.E.I.</u>	<u>N.S.</u>	<u>N.B.</u>	<u>Que.</u>	<u>Ont.</u>	<u>Man.</u>	<u>Sask.</u>	<u>Alta.</u>	<u>B.C.</u>	<u>Canada</u>
1											
0 - 4	8,071	8,194	16,054	7,869	9,830	10,839	9,826	10,317	12,766	10,935	10,654
5 - 9	8,287	10,891	8,872	9,431	12,280	12,329	10,628	11,771	12,036	12,933	12,105
10 - 19	12,007		10,842	12,483	11,676	14,912	13,283	13,042	15,380	14,927	13,639
20 - 49	14,885	9,246*	12,518	13,120	12,485	15,932	14,100	16,152	16,853	17,732	14,753
50 - 99	14,184	8,095	12,245	13,391	12,939	16,859	14,327	18,311	20,113	20,560	15,662
100 - 199	14,209*		18,136	13,734	13,949	17,182	16,096	21,202	20,472	23,608	16,671
200 - 499		18,159*	15,559	17,669	17,136	17,990	14,320	26,779*	22,404	22,681	18,150
500 - 999			15,610	22,522	18,871	21,707	15,484*		18,481	22,531	20,514
1,000 & over			10,263	16,210	18,508	24,605				23,625	22,531
T o t a l	14,132	12,121	13,386	15,272	14,948	18,974	14,214	19,533	18,441	20,512	17,481

* Nfld. = 100 and over - P.E.I. = 10- 49 - Man. = 500 and over - Sask. 200 and over
100-499

Source: Statistics Canada, Cat. # 31-210, 1973, Type of Organizations and Size of Establishment.

In New Brunswick, productivity in establishments of five hundred to one thousand employees at \$22,522 in 1973, was nearly the highest recorded in all provinces in Canada. This category of establishments contributed over 25 per cent of total value added yet represented only 10 per cent of the manufacturing labour force. While this fact would indicate that productivity improvement could be achieved by going to large scale, it must be noted that the New Brunswick performance in this category of establishments is an exception and is possibly the result of a few large plants in this category showing an above average performance.

In Quebec, value added per production worker in establishments employing 5-9 employees slightly exceeded the Canadian average. Productivity in all other categories of establishments was inferior to that achieved in Ontario, Saskatchewan and British Columbia.

In Ontario, the productivity of establishments of 200-500 employees was below the Canadian average in 1973 and lower than that experienced in Prince Edward Island, Saskatchewan, Alberta and British Columbia for the same category of establishments. Thus, while small as well as large size establishments in Ontario fared well in terms of productivity, productivity in medium-size establishments would need to be examined more closely with a view to improvement.

In Saskatchewan, establishments of 200 employees and over showed a better than average productivity - \$26,779 compared to an average of \$22,359 for Canada; these establishments employed 46 per cent of the total manufacturing labour force. Thus, while very small establishments in Saskatchewan lagged behind in productivity, the relatively larger size establishments performed well. By comparison, the establishments of over 200 employees in Alberta did not fare so well but represented only 3 per cent of total manufacturing establishments.

The basic conclusion emerging from this overview is that the gap in output per employee in small establishments in disadvantaged regions of Canada vis-a-vis the Canadian average was wider than for medium-sized establishments. This indicates there is significant room for productivity improvement in Canada within smaller establishments which can be achieved without going to larger scale.

Further, with regard to the competitiveness of smaller firms, a recent study by F.M. Scherer⁽¹⁾ has shown that there was a tendency for plants to be sub-optimal in size in Canada but that unit costs of production were not much higher even when a plant was only one third the optimum size. This result suggests that the difference in plant size can only explain a small part of the difference in costs per unit.

While the size of plant in Canadian manufacturing has had some effect on productivity performance, it would appear that excessive product diversification in Canadian manufacturing has had a more significant influence in the levels of productivity. A number of studies have shown that because of the limited size of the national market and the structure of the Canadian and foreign tariffs which have prevented most manufacturing industries from exhausting economies of scale and specialization, manufacturing firms in Canada are generally smaller than their U.S. and foreign counterparts. Generally associated with small scale plants are short production runs and excessive product lines commingled under one plant roof. Even in larger manufacturing plants which could take advantage of product specialization, the problem of excessive diversification remains.

Although it is difficult to substantiate that product diversification is more predominant in disadvantaged regions of Canada than in developed regions,

(1) F.M. Scherer, The Determinants of Industrial Plant Size in Six Nations, The Review of Economics and Statistics, May 1973, pages 137-138.

a priori evidence seems to suggest that this factor does contribute to the variations in regional productivity. Further evidence to substantiate this point has been difficult to obtain.

2. Provincial Industrial Structure and Location Factor

For historical, geographical and other reasons, the industrial structure varies widely from one region to another. It is generally argued that the proximity of resources and markets, easier access to financial and other services and other production and marketing advantages have resulted in some areas of Ontario and Quebec becoming high growth areas and that these advantages have provided a strong attraction for new firms to gravitate to these areas. These facts have strengthened the secondary manufacturing sector of central Canada which, in many instances, has shown a better productivity performance. On the other hand, much of the manufacturing sector in the Prairies, the Atlantic region and British Columbia is based largely on primary manufacturing industries. In particular, the manufacturing activity in the Atlantic Region is heavily oriented towards food and beverage and wood industries; that of the Prairie region towards the food and beverage industries while British Columbia manufacturing is largely concentrated in the forest products industries.

In order to ascertain the importance of the basic types of manufacturing industries on productivity in various regions, the productivity performance of firms in so-called primary manufacturing industries - that is, those in which 20 per cent or more of the total costs of materials and supplies originated from the primary sector of the economy and those in the remaining secondary manufacturing industries has been examined. The results of this analysis are shown in Table IV. Unfortunately, due to lack of data, a similar manufacturing breakdown could not be provided for the Atlantic region.

TABLE IV

Value Added per Production Worker
in Primary and Secondary Manufacturing,
by Province - 1972

	<u>Primary</u> <u>Manufacturing</u>	<u>Rank</u>	<u>Secondary</u> <u>Manufacturing</u>	<u>Rank</u>
Quebec	22,343	4	15,400	5
Ontario	24,420	2	20,969	1
Manitoba	19,108	6	14,009	6
Saskatchewan	24,301	3	19,823	3
Alberta	24,827	1	19,301	4
British Columbia	21,848	5	20,035	2
Canada	24,042		17,085	

The strong productivity performance registered by Saskatchewan, and Alberta in primary manufacturing was of particular importance to these regions given that, as is suggested by the data in the following table, the bulk of manufacturing activity in these provinces has taken place in the primary manufacturing sector. It should also be noted that while productivity in primary manufacturing in B.C. was relatively low in 1972 in comparison to the Canadian average, that province derived the greatest percentage of value added from the primary manufacturing sector during that year.

TABLE V
Percentage Distribution (1)
of
Value Added in Primary and Secondary
Manufacturing
by Province/Region - 1972

	<u>Primary</u> <u>Manufacturing</u> %	<u>Secondary</u> <u>Manufacturing</u> %	<u>Total</u> %
Atlantic	61.9	38.1	100.0
Quebec	40.7	59.3	100.0
Ontario	32.5	67.5	100.0
Manitoba	45.3	54.7	100.0
Saskatchewan	57.1	42.9	100.0
Alberta	59.3	40.7	100.0
British Columbia	74.0	26.0	100.0
Canada	41.4	58.6	100.0

Source: Statistics Canada, Manufacturing Industries in Canada (Catalogue No. 31-203)

- (1) The unavailability of data for some industries tended to bias the results towards a greater secondary manufacturing sector for all provinces/regions except Quebec and Ontario.

The above tables suggests that the regions of Canada with lower levels of productivity should perhaps concentrate on the development of industries for which resources are readily available rather than in manufacturing industries for which raw materials need be obtained either from other regions or from other countries.

This might be difficult to achieve in view of the existing structure of industries in the regions. Looking back, a number of considerations entered into decisions to locate in certain areas in the past and some of these considerations might still be valid. For example, transportation costs figured more predominantly in the determination of the location of industries producing goods with a high value to weight ratio; other industries were attracted to areas offering a ready availability of water and electrical power.

The fact remains that some regions of Canada have succeeded in attracting a larger number of "high growth" industries for the reasons mentioned above. The basic question is whether or not differences in industry structure or "mix" have resulted in varying productivity levels between provinces/regions of Canada. The Economic Council in a recent report⁽¹⁾ has examined the extent to which regional differences in industry structure have contributed to regional differences in productivity performance. The report concluded that in four of five regions of Canada, the differences in productivity levels were attributable to factors other than industrial structure. As a rule, the industrial structure accounted for less than 30 per cent of the regional differences in productivity levels. Only in the Prairie region did industrial structure have a greater - and unfavourable - impact on productivity performance. Regional weaknesses in productivity performance were not limited to particular manufacturing industries but showed up in most of them.

(1) Economic Council of Canada, Options for Growth, Twelfth Annual Review, pp 32-35

The Council further concluded that the small role played by industry structure in explaining regional differences in either the levels of productivity or productivity growth rates makes it reasonable to maintain that, in low income regions, productivity levels can best be improved by proceeding on an industry-by-industry basis and that the scope for improving productivity and income in these regions by fostering a different industrial structure was probably quite limited.

A similar conclusion was reached when we superimposed the Canadian employment structure on the value added per production worker in each province and examined the effect of this new structure on productivity. The results are contained in Table VI.

TABLE VI

Value Added per Production Worker in
Manufacturing Industries by Province

1972

	<u>Value Added</u> <u>Production Worker</u>	<u>Value Added / Production Worker</u> <u>with Canadian Employment Structure</u>
Newfoundland	\$12,900	\$12,297
Prince Edward Island	12,642	9,228
Nova Scotia	14,231	14,048
New Brunswick	14,762	14,871
Quebec	17,671	19,068
Ontario	22,040	21,245
Manitoba	15,919	16,880
Saskatchewan	22,129	18,556
Alberta	22,275	20,763
British Columbia	21,352	20,801

New Brunswick, Quebec and Manitoba were the only provinces that would supposedly increase their productivity as a result of such restructuring in manufacturing. The gain would be marginal in New Brunswick, 7.9 per cent in Quebec and 6 per cent in Manitoba.

The results thus show that the structural factor is perhaps not as significant as first supposed. It is a fact that some industries in all regions have performed well. For example, paper and allied industries and non-metallic mineral products have demonstrated relatively high productivity in the Atlantic provinces, while rubber and plastics and wood industries have demonstrated relatively higher productivity in the Prairie provinces. In Quebec, machinery and electrical products have realized high productivity of labour and of labour and capital combined. Therefore, a change in the overall industrial structure of manufacturing industries in the disadvantaged regions of Canada might not bring about all the desired results of improved productivity.

Related to the question of structure or "mix" of industries is the absolute size of regional markets and its effects on productivity. The lower transportation costs associated with the proximity of large markets, economies achieved in obtaining intermediate inputs, easier access to financial resources and consultative and business services are all features which stem from larger markets and which contribute to increased efficiency and higher levels of productivity.

The productivity gains associated with production for large markets are labelled "economies of scale" while gains resulting from production in large markets, for the reasons cited above, are labelled "increased returns to a given scale". The following table lists three measures which may act as proxies for the size of regional markets.

TABLE VII

Measure of Market Size

By Province and Atlantic Region

1972

	<u>Value of Manufacturing Shipments</u> (\$000's)	<u>Total Manufacturing Employment</u>	<u>Population</u> (000's)
Atlantic	2,596,221	78,813	2,082
Quebec	17,031,867	517,878	6,051
Ontario	34,337,803	821,614	7,824
Manitoba	1,665,470	50,602	992
Saskatchewan	711,578	15,570	916
Alberta	2,616,645	54,194	1,683
British Columbia	5,436,245	137,237	2,247

Correlation coefficients between labour productivity and each of these measures of size were found to be positive. This means that means to expand size of the market would be an effective vehicle to increase production.

3. Capital Intensity

The degree of capital intensity has long been considered an important factor in explaining inter-industry differences in productivity. In fact, the rank order correlation coefficient between labour productivity and capital intensity which has shown to be .78 supports this contention. (A value of one would denote a perfect correlation between labour productivity and capital intensity). Similarly differences in capital intensity among the provinces result in intra-industry differences in labour productivity. Since there are a limited number of alternate production methods available to each industry, each requiring different proportions of capital and labour, the intra-industry variations in capital intensity is usually smaller than the range of differences found among industries.

Although comments must remain guarded due to the lack of data in some regions, a general pattern nevertheless emerges from Appendix "G". Capital intensity as measured by the capital-labour ratio, given the available capital stock data for 1972, was higher in the Atlantic provinces, in Saskatchewan, Alberta and British Columbia than in the remaining provinces. As has been argued elsewhere in this paper, the level of capital intensity tended to be higher in primary manufacturing type of industries. Given that much of the economic activity in the four aforementioned geographic areas was in resource and resource-based industries, it is not surprising that these areas were more capital-intensive, overall, than in the remaining provinces.

Since high levels of capital intensity generally result in higher labour productivity which in turn is usually associated with higher wage rates, one would expect that wage rates in these provinces registering high capital-labour ratios to be also high. This relationship in fact holds for all provinces except for the Atlantic provinces. It would appear that either the quality or the effective utilization of capital in the Atlantic region lags behind that of the remaining provinces.

In seventeen of twenty major manufacturing sectors, the degree of capital intensity was lower in Quebec than in Ontario. The Quebec sectors exceeding the Ontario level of capital intensity were paper and allied products, electrical products, and petroleum and coal products. In the first two of these industry sectors, value added per production worker was higher in Quebec than Ontario.

It was suggested earlier, that the province of Quebec tended to specialize in labour-intensive industries. It appears from the data on capital stock per production worker that more labour intensive production methods are employed in most Quebec industries. The fact that average wages in manufacturing were almost eighteen per cent lower in Quebec in 1972 may partly explain the difference in capital intensity between Ontario and Quebec. A further reason for fewer capital intensive type of industries in Quebec could be the difference in costs of power between Ontario and Quebec. Overall, the cost of power was roughly 25 per cent higher in Quebec in 1973.

The capital-labour ratios contained in Appendix "G" indicate that the more disadvantaged regions are not always undercapitalized. For example, capital stock per production worker in the Atlantic region in 1972 was some 45 per cent greater than in Canada as a whole. This figure might be exaggerated as a result of large investments in plant and equipment in a few large projects. The recent productivity performance in the Atlantic provinces suggests that the quality of the existing capital stock may be inferior to that in other provinces showing higher productivity. Consequently, additional investment on capital equipment, embodying the most up-to-date technology to replace some of the existing stock currently in use, might result in realizing productivity gains in the Atlantic provinces.

4. Management and Entrepreneurial Skills

To a significant degree, management and entrepreneurial skills may be imparted through the educational process. In particular, the pool of university graduates is generally assumed to be the source of middle and upper level managers. Consequently the amount of expenditures spent on higher education is of considerable importance in ensuring the availability of a well educated managerial group.

The data listed in the following table suggests that very little variation exists among provincial university expenditures in proportion to total education expenditures except in the province of Quebec.

TABLE VIII
Average Annual University Expenditures
As a Percentage of
Total Educational Expenditures (1971-1974)

Atlantic Region	23.95%
Quebec	15.84%
Ontario	23.97%
Manitoba	24.97%
Saskatchewan	22.34%
Alberta	24.56%
British Columbia	21.58%
Canada	21.55%

Source: Statistics Canada, Financial Statistics of Education, 1971-74 (Cat. No. 81-208).

Given the high level of geographic mobility of young people out of the Atlantic region and, to a lesser extent, out of Manitoba and Saskatchewan, the above percentages may not reflect equal benefits relative to expenditures made on university education in each province or region.

Quebec was the sole exception to the above general pattern. The relative level of expenditures on university education in this province was almost six percentage points below the Canadian level and a full nine percentage points below Manitoba, the province with the highest proportion of average annual university expenditures during the period covered. Quebec ranked the highest in the percentage of total educational expenditures directed both to elementary and secondary education and to post-secondary non-university education. The latter case indicates the importance of the CEGEP system as an alternative educational stream to universities in Quebec, in order to develop a more skilled labour force.

As demonstrated by the data in Table IX, Quebec registered the smallest proportion of managers having at least Grade Twelve.

TABLE IX
Education Attainment of Those Employed

In Management Occupations

(in percentages)

	Less Than	Grades	Grade	Grades	Some	Univ.
	Gr. Nine	Nine & Ten	Eleven	Twelve and Thirteen	Univ.	Degree
	%	%	%	%	%	%
Newfoundland	5.8	7.6	20.7	3.9	27.0	34.9
Prince Edward Island	5.9	9.8	5.9	11.8	25.5	41.2
Nova Scotia	3.7	8.8	12.5	18.3	15.4	41.4
New Brunswick	7.8	7.4	12.5	11.0	15.9	45.3
Quebec	10.5	13.2	12.3	16.5	15.2	32.3
Ontario	6.7	10.5	8.1	31.3	12.7	30.7
Manitoba	6.3	9.3	14.3	14.8	13.9	41.4
Saskatchewan	6.3	8.5	8.5	21.7	17.7	37.3
Alberta	4.1	6.4	6.3	17.0	8.5	57.7
British Columbia	6.0	10.0	8.0	23.8	14.3	38.0

Source: 1971 Census of Canada

Those with either Grade Twelve or Thirteen form the largest group of managers in Ontario. Even if the three highest educational levels were considered, Ontario still ranked sixth highest of all the provinces in the level of education of its managers. Although a number of factors could explain this occurrence, it is entirely possible that firms in Ontario rely more heavily on age and experience, e.g., "on the job" training, than on the formal educational process.

The age distribution of managers by Provinces for 1971 is contained in the following table:

TABLE X

Age Distribution

In Management Occupations - by Province - 1971

	Age Group				Average Age
	15-24	25-44	45-	Total	
Newfoundland	175	995	700	1,870	40.8
Prince Edward Island	20	125	150	295	43.9
Nova Scotia	130	1,120	1,165	2,415	43.6
New Brunswick	100	1,110	760	1,970	41.7
Quebec	1,640	23,195	20,745	45,580	43.3
Ontario	2,445	29,330	30,595	62,370	44.0
Manitoba	240	2,225	2,330	4,825	43.7
Saskatchewan	190	2,145	1,710	4,045	42.5
Alberta	365	5,070	4,580	10,015	43.3
British Columbia	285	4,560	5,725	10,570	45.2

Source: 1971 Census of Canada

Ontario, which had the smallest percentage of managers holding a university degree also had the second highest average age in management occupations of all provinces. A calculated rank order correlation coefficient of $-.1253$ suggests that, in all provinces, there was a slight inverse relationship between education and experience.

5. Education

In recent years, increasing attention has been focussed on education as an important source of inter-provincial differences in productivity. Table XI relates educational expenditures and educational attainment of the labour force to labour productivity by province/region.

TABLE XI

Comparison of Education Expenditures, Educational Attainment of Manufacturing Labour Force and Value Added Per Production Worker in

<u>Canadian Manufacturing, by Province</u>								
<u>Educational Expenditures - 1973</u>				<u>Percentage of Employed Manufacturing Labour Force with Average Grade Twelve or Higher - 1971</u>		<u>Value Added Production Worker - 1972</u>		
<u>Per Capita</u>	<u>Rank</u>	<u>Per Manufacturing Labour Force Participant</u>	<u>Rank</u>	<u>%</u>	<u>Rank</u>	<u>\$</u>	<u>Rank</u>	
<u>\$</u>		<u>\$</u>				<u>\$</u>		
Atlantic	333	6	950	4	17.08	7	11,490	7
Quebec	389	3	971	3	20.00	6	13,470	5
Ontario	429	2	993	2	34.79	3	17,021	1
Manitoba	372	4	931	5	25.28	5	12,327	6
Saskatchewan	338	5	879	6	34.33	4	16,260	3
Alberta	432	1	1038	1	39.80	1	16,204	4
B.C.	329	7	777	7	39.59	2	16,455	2
Canada	397		975		29.69		15,441	

SOURCE: Statistics Canada, Catalogue

Based on the above data, no correlation existed between educational expenditures and labour productivity. However, the relationship between the percentage of the employed labour force possessing at least Grade Twelve education and labour productivity, was very much closer, as indicated by a calculated correlation coefficient of $.91$. Of particular interest is the fact that there is no close correlation between educational expenditures and educational attainment, which suggests a "spill-over" effect. This effect takes the form of heavy migration of educated manpower e.g. funds are spent to educate individuals in low productivity, low wage areas, but on completion of their education, a number of these individuals move to high productivity, high wage areas. These results suggest that increasing educational expenditures in low productivity areas may do little to mitigate regional variations in productivity. However, education appears to be an important variable in explaining variations in productivity among the provinces.

Table XII lists the percentage of employed labour force in each province/region having Grade Twelve or more, for each of the twenty major manufacturing sectors.

TABLE XII
Percentage of Labour Force
with
Twelve or More Years of Schooling in Major Manufacturing Industries, by
Province - 1971

	<u>Atlantic</u>	<u>Que.</u>	<u>Ont.</u>	<u>Man.</u>	<u>Sask.</u>	<u>Alberta</u>	<u>B.C.</u>	<u>Canada</u>
Food & Beverage	11.46	16.63	30.17	23.42	29.46	34.03	35.25	24.07
Tobacco	50.00	18.74	32.10	30.77	-	71.43	62.50	24.81
Rubber & Plastics	32.22	18.83	33.07	27.58	40.00	45.76	48.10	29.72
Leather	16.99	10.53	18.14	16.56	-	33.34	28.38	14.70
Textile	15.75	15.13	26.03	21.92	37.5	33.98	33.21	20.29
Knitting Mills	6.97	17.55	18.94	29.88	-	31.82	36.36	17.80
Clothing	12.94	9.96	18.11	14.22	37.18	22.48	27.34	12.89
Wood	9.72	10.14	19.77	15.90	21.22	25.96	28.91	21.16
Furniture	15.00	14.96	22.81	18.14	20.42	35.03	33.52	20.84
Paper & Allied Products	23.10	21.58	30.89	24.57	38.27	39.94	50.34	29.70
Printing & Publishing	30.74	30.81	44.70	34.14	43.90	47.23	49.61	40.78
Primary Metals	21.21	21.54	33.56	27.04	36.21	44.61	38.87	30.92
Metal Fabricating	19.54	19.82	34.73	25.55	32.31	36.40	44.69	31.44
Machinery	38.10	30.66	46.24	30.69	41.63	51.98	57.79	43.38
Transportation	15.52	23.17	32.69	25.36	34.68	39.71	43.17	30.26
Electrical	24.20	30.99	40.26	38.53	47.91	52.13	61.13	38.15
Non-Metallic Minerals	16.93	27.62	29.95	24.36	27.81	32.94	37.28	26.98
Petroleum and Coal	42.02	38.16	62.14	40.17	46.92	62.52	60.32	53.09
Chemicals	32.39	35.80	50.27	43.57	57.94	57.09	56.11	45.59
Misc. Manufacturing	25.41	22.44	38.25	30.06	34.66	51.92	50.76	34.55
T o t a l	17.08	20.00	34.79	25.28	34.23	39.80	39.59	29.69

SOURCE: Statistics Canada, 1971 Census of Canada

Overall, the Atlantic region had the smallest percentage of its manufacturing labour force possessing at least a Grade Twelve education. Using this same measure of educational attainment, this region also had the lowest levels of educational attainment of all geographic areas in ten of the twenty major manufacturing sectors and was below the Canadian average in seventeen sectors. As was stated earlier in the paper, the Atlantic region also had the lowest level of labour productivity in all seven industries for which data was available. The wood products and non-metallic minerals industries recorded both the lowest level of educational attainment and productivity in Canada.

The proportion of the employed labour force in Quebec having higher levels of education was markedly above the Atlantic region yet, in ten of twenty industries, the percentage of the labour force in this province having twelve or more years of schooling was the lowest in Canada. Non-metallic minerals was the only industry in Quebec to exceed the Canadian average in the proportion of employees having twelve or more years of schooling.

The percentage of the manufacturing labour force possessing at least Grade Twelve was considerably higher in Manitoba than in either Quebec or the Atlantic region yet was significantly below that of the other Prairie provinces. Manitoba exceeded Quebec in this measure of educational attainment in every industry except non-metallic minerals. In terms of labour productivity, however, this industry was the best performer in Manitoba relative to Canada in 1972 and further, Manitoba surpassed the level recorded by all other provinces in labour productivity in this industry. On the other hand, the knitting mills industry, another top performer in Manitoba as measured by labour productivity, was also well above the Canadian level in educational attainment.

The average educational attainment of the manufacturing labour force in Saskatchewan and Ontario was roughly equal - approximately 34 per cent of those employed in manufacturing in both provinces had at least twelve years of schooling. Educational attainment in Ontario was below the Canadian average only in the wood products industries and labour productivity was also below the Canadian level in those industries. Conversely, clothing mills in Saskatchewan recorded the highest labour productivity of all provinces for which data was available - and also had the highest proportion of employees with twelve or more years of schooling.

Alberta and British Columbia were the two top performers in terms of educational attainment with British Columbia ranking the highest in Canada in eleven and Alberta in six of the twenty major industries. British Columbia, which had a slightly greater level of labour productivity, exceeded Alberta in educational attainment in twelve of the twenty sectors. Further, in nine of fifteen industries for which data was available, British Columbia surpassed Alberta both in labour productivity and educational attainment.

The foregoing suggests that at the provincial level, there is a strong positive correlation between attained education and labour productivity. This relationship has been shown to be significantly weaker at greater levels of industrial disaggregation.

III TOWARDS PRODUCTIVITY IMPROVEMENT IN THE REGIONS OF CANADA

The previous two sections have served to outline, analyse and evaluate the productivity record and the major factors which have influenced the productivity performance in manufacturing in the regions of Canada. On the basis of this groundwork, the following section will attempt to identify the strengths and weaknesses, in terms of productivity, in the manufacturing sector of each region with a view to the formulation of appropriate policy measures to enhance productivity.

In earlier sections of this paper much attention was focussed on the comparison of the level of productivity in each individual manufacturing sector in the provinces with the corresponding Canadian average level of productivity. It should be noted that the Canadian average served as a useful "benchmark" for such comparisons but it should not generally be considered the target level which similar industries in all provinces should achieve. Cognizance must be taken of the particular set of circumstances of each geographic area of Canada, i.e., the industrial structure, resource endowment, the aspirations of the people, etc. that limit the potential level of productivity, be it at a level above or below the Canadian average. A major goal should be to improve productivity taking into account the different "realities" of each region of Canada. With this in mind, the strengths and weaknesses with regard to manufacturing productivity in the various regions of Canada are discussed below.

Atlantic Region

The existing manufacturing base in the Atlantic provinces is closely tied to the major natural resources available in the region, for example, the food and beverage and wood products industries. These industries accounted for roughly 44% of the total manufacturing employment in 1972. Productivity performance in these sectors, while not relatively high, has shown some

improvement over the last years. On the other hand, the rubber products and machinery industries, which accounted for only 3% of total manufacturing in 1972, relied more heavily on imported raw materials and this fact, in part, could explain the relatively lower level of productivity recorded by these industries.

It would appear, then, that measures to improve productivity in these manufacturing sectors which are relatively large, and for which natural advantages already exists, e.g., food, beverage and wood industries, might prove a beneficial short and medium-term goal.

The earlier analysis of factors affecting productivity revealed a number of pertinent observations with respect to the manufacturing sector of the Atlantic region. It was shown that this region recorded some of the highest ratios of capital stock per production worker. However, it appears that it is not so much the amount of capital stock which is important, but rather the kind of existing and new stock of plant and equipment, that is plants embodying the most up-to-date technology. This point is difficult to substantiate, but if such is the case, there is need then to encourage both existing and new firms to install plants employing the newest technology. One possible caveat is that more advanced technology may be embodied in equipment which is unsuitable for the size of regional market e.g., its capacity may greatly exceed the level of output that can be marketed profitably. If this is the case, such policy levers as capital cost and depreciation allowances would be largely ineffective in improving the quality of the capital stock. New or expanded markets would seem to be a prerequisite for the establishment of plants embodying new technology.

The level of education appeared to be an important factor adversely affecting productivity in the Atlantic region. The availability of a highly skilled, well trained and properly motivated labour force is a necessary requirement for achieving increased productivity. Such a highly skilled and trained labour force is necessary for the installation, maintenance and operation of sophisticated capital equipment. Finally, an educated managerial group is visualized as an important element to ensure that capital and labour are efficiently combined in the production process.

At first glance, increased expenditures on education would seem to be required to increase productivity in the Atlantic region. However, the intent of such a policy would be generally frustrated by the high outmigration of educated manpower. Perhaps, the provision of management expertise and training facilities through the small business policy thrust could be a significant and more immediate substitute for increased educational expenditures and could dampen the effects of such out-migration from the Atlantic provinces. Also public awareness of provincial opportunities and business aid programs may help to stem the outflow of skilled workers and/or management.

As mentioned earlier, market size was also found to have a significant impact on the productivity performance of this region. It was argued that access to larger markets presents the opportunity to benefit from economies of scale, and that the small and depressed markets in the Atlantic provinces limit such economies. The markets available to Atlantic manufacturing firms are further limited by high transportation costs. These costs, of course, are largely a function of the distance from the main consuming "core" of Canada. However, the contention that the rate structure favours the transportation of raw and semi-processed goods to central Canada thereby discriminating against further processing in the Atlantic region warrants further investigation.

Quebec

The labour-intensive nature of production is the most striking characteristic of manufacturing industries in Quebec. In fact, in 1972, only the electrical products industry had a capital/labour ratio which exceeded the Canadian average.

In recent years, the bulk of the available investment funds in Quebec have been channelled to the utilities and construction sectors, with relatively small amounts being directed to the manufacturing sector. Hopefully, the completion of many large costly projects in Quebec, e.g. the Olympic site, will now free more investment funds for manufacturing.

Increased investment could lead to productivity improvements in two respects: first, benefits may accrue from an increase in the quantity and quality of machinery and equipment in industries for which a firm economic base already exists. Included in this group would be the food and beverage, clothing and paper products industries. Investments in more modern or expanded plants with new technology would require the retraining of a large portion of the labour force in these industries to operate these expanded or improved plants. As a result, overall efficiency would possibly be improved. Secondly, in addition to the modernization of existing plants in the traditional Quebec industries, an equally important avenue towards increased productivity appears to be the funnelling of increased amounts of investment towards other sectors such as metal manufacturing, primary metal, transportation and electrical product industries, where an already existent small manufacturing base could be expanded. Increased capital investment in these sectors would entail the redeployment of the labour force from the less productive sectors (textiles, clothing) to those registering higher levels of productivity. Again, this would necessitate large scale retraining of the affected labour force participants.

As discussed earlier, the level of education of the employed labour force in Quebec has been significantly lower than most provinces surpassing only that attained in the Atlantic region. The impact of education on productivity was previously described; it has a direct effect in that it is an "investment in human capital"; it has an indirect effect via the introduction of more sophisticated capital equipment; further, an educated managerial group can lead to the rapid acceptance and use of more advanced methods of production.

While important steps have been made in Quebec to increase the level of education and skills of the labour force, efforts in that direction must continue. As opposed to the Atlantic provinces, the beneficial impact of increased educational expenditures would generally be limited to that province in that cultural differences seem to overpower the attraction of higher wages, such that out-migration from Quebec is very much lower than that in the Atlantic provinces.

A final and vital aspect is that of ensuring the existence of sufficiently large markets for the products of new and expanded industries. The reduction or elimination of tariff and non-tariff barriers to trade resulting from the current MTN negotiations in Geneva could offer expanded opportunities for new or expanded firms in that province.

Ontario

Based on measures of output per unit of labour of capital and of labour and capital combined, the overall productivity performance of Ontario outstripped that of all other provinces and regions. Further, in eleven of twenty manufacturing sectors, Ontario recorded the highest level of labour productivity in Canada. Relatively high levels of productivity were achieved in the food and beverage, metal fabricating, machinery and transportation industries.

An analysis of the factors affecting productivity suggested that while productivity in many Ontario industries was relatively high, some scope for improvement exists. Based on this analysis and on research done elsewhere, it appears that a reduction in tariffs and non-tariff barriers holds considerable promise for increasing manufacturing productivity in Ontario. A familiar argument suggests that lower production costs in Ontario would accompany a reduction in trade barriers as producers reap the benefits of economies of scale and specialization. Specialization would accrue both within and among firms. With respect to the former, it has been argued that the tariff has encouraged the production of a wide range of manufactured goods within each firm and in excessive product diversification. Given the relatively small domestic market, this has meant short production runs.

Specialization among firms is usually seen as the result of restructuring activity among foreign "branch plants" and domestic firms. "Branch plants", that is foreign subsidiaries located in Canada to service the Canadian market, tend to locate in and around major consuming markets. The attraction of these areas is reinforced by the existing transportation rate structure which tends to bias the location decision towards these areas to serve more distant markets.

Tariff reduction would lower costs due to two additional factors. First, costs of intermediate inputs, both imported and domestic, would be lower. Second, given that the natural flow of trade in North America runs North-South, transportation and distribution margins would be reduced.

The gains to Ontario from tariff reductions will depend, in large part, on the adaptability of producers to the new, more open economic environment and their aggressiveness in seeking new market opportunities.

In the face of rising factor costs vis-a-vis the U.S., plants in Ontario must achieve a more efficient organization of the factors of production in order to reduce unit costs of production and to remain competitive.

Finally, an earlier analysis has shown that the educational attainment of the managerial group in Ontario was considerably below that of the U.S. Ample scope exists, therefore, to improve the level of education of managers and also to broaden their experience through the decentralization of decision-making in multinational corporations operating in Canada.

Prairie Region

Although the Prairie provinces share the characteristic of having a relatively small manufacturing sector, this region is not an economically homogenous entity. Manitoba's economy is not nearly as strongly oriented to resource and resource-based activity nor are the industries in this province as capital-intensive as is characteristic of both Alberta and Saskatchewan. In addition, the overall level of labour productivity in Manitoba lagged almost 25% behind that of both Alberta and Saskatchewan, in 1972. In industries for which data was available, non-metallic minerals was the only industry in Manitoba to exceed the level of productivity attained by the same industries in Alberta or Saskatchewan in that year.

The food and beverage industry is important to the economies of all three Prairie provinces. In Manitoba, this industry accounted for 22 per cent of total manufacturing employment and nearly 38 per cent of total shipments, in 1972, whereas in Saskatchewan, it represented 39 per cent of total employment and 48 per cent of shipments. The equivalent figures for Alberta were 26 per cent of total employment and 40 per cent of shipments. In view of their importance, efforts to improve productivity should focus on these industries, but not, however, to the exclusion of the remaining ones.

The Prairie Region has neither the advantages necessary to produce goods in large quantities for consumption in other regions nor does it have a population large enough to support a broadly based manufacturing sector. This contention is supported by the data in Appendix "F". In this Region, the proportion of the total number of establishments which have less than ten employees exceeds the Canadian level. In fact, the size of firms in Saskatchewan tends to be smaller than those located in PEI, with Alberta and Manitoba not far behind this latter province. To a significant degree, then it would appear that the Prairie provinces are unable to generate the increased returns to a given scale that accompanying production in large and diverse markets nor to gain the benefits of economies of scale that result from production for large markets.

As was suggested for the Atlantic Provinces, appropriate industrial development incentives offered to expand existing firms or set up new plants in areas where worthwhile opportunities exist (assuming sufficiently large markets) as well as encouragement to modernize existing plants could result in increased productivity performance in the Prairie Region.

British Columbia

The economy of B.C. is very similar in nature to that of Alberta and Saskatchewan; it is strongly oriented towards resources and resource-based industries and, correspondingly, is also capital-intensive, for example wood products and pulp and paper industries. While the productivity performance in those industries in B.C. was relatively high, scope exists to further improve the productivity of firms in these and other areas and more important to increase their competitiveness. As the analysis has shown, there is need to improve the productivity of small firms in B.C. especially in the electrical and machinery industries.

It would appear that excessive product diversification has resulted in low productivity in plants across Canada. A recent analysis⁽¹⁾ has suggested that a reduction in tariffs would result in longer production runs, increased product specialization and hence, in increased productivity. This analysis maintains, however, that the magnitude of the adjustment, and consequently the magnitude of the gains, both in terms of income and productivity, would be less in the case of B.C. than either for Ontario or Quebec. Further, if the level of educational attainment is any indication, it appears that the management group in B.C. would be generally more able to adjust to the more competitive economic environment of the future than would managers in either Quebec or Ontario.

Conclusions

An attempt was made in this paper to examine productivity performance and the major factors behind it and also to assess the possibilities for productivity improvement in manufacturing in the provinces of Canada.

The data presented has demonstrated marked differences in productivity levels which exist among the provinces of Canada and thus suggests ample scope for improvement in the quality of the productive factors and the efficiency with which they are combined in the production process.

In the attempt to identify factors which have impeded the efficiency of the production process in various provinces, it has become clear that no single factor adequately explains the wide variations in productivity. Some factors which were believed to have a strong influence on productivity performance were found to be somewhat less important than anticipated. As a case in point, the structure or "mix" of industries in the disadvantaged regions - in which are located a large proportion of low growth industries - did not appear to be as significant as first supposed in explaining productivity difference.

Another factor which appeared to be of lesser importance was plant size. Although modest gains in productivity may accrue from economies of scale, these benefits are greatly outweighed by those resulting from improvement in the manner in which the factors are combined regardless of the scale of production. One factor, however, which has been singled out in recent studies as having adverse effects on the levels of productivity was the excessive degree of product diversification in Canadian manufacturing. This fact suggests the need for measures to widen markets and to lengthen production runs in manufacturing in the low productivity regions in order to improve productivity performance.

With respect to capital equipment, the analysis pointed to the fact that the relatively heavy use of plants and buildings and of machinery and equipment in the Atlantic provinces has not resulted in higher productivity as measured in terms of output per unit of labour or capital or of combined labour and capital. The relatively poor productivity performance in this region seems to indicate that relatively inefficient use is made of the existing capital stock and that the quality of capital (in terms of being technologically advanced) lags behind that employed in the remaining provinces. On the other hand, the analysis suggested that both Manitoba and Quebec would possibly benefit, in terms of productivity, from increased capital investments.

(1) Daly and Globerman, Tariff and Science Policies: Application of a Model of Nationalism, p. 54

The quality of the labour force, as measured by education, training skill, managerial competence and the application of effort, also was shown to play a prominent role in determining the levels of productivity. The analysis of the educational attainments of the labour force including that of management has revealed that:

- a) management abilities vary considerably across Canada. Also, there is at present a general shortage of well-trained managers in some regions of Canada.
- b) the levels of educational attainment of the labour force also varies extensively among regions and among industries in Canada. There is a positive correlation between educational attainment of the labour force and productivity.

The analysis showed that there was considerable room for improvement in the quality of management and of the labour force in general in the Atlantic region and in some parts of Quebec and Manitoba. There seems to be a need to examine and perhaps reorient existing programs to upgrade the education and skill qualifications of the existing labour force including professional workers and management. There is no doubt that closer co-operation between business, labour and the educational systems, along with improved counselling of students regarding future manpower needs will be required to meet these needs.

As the analysis has shown that industries in the disadvantaged regions of Canada are relatively inefficient users of labour and capital, this might indicate that the root of the problem lies in the effectiveness with which the factors are combined in production. In this regard, there is scope for improvement in the organization of the factors of production at the industry level. But even with such improvement, the industries in the regions, because of external factors, may still not be able to match the results achieved in other provinces or regions where the environment is different and possibly more conducive to high performance. The solution may thus lie in changing the basic environment in which the industries operate in some regions so as to maximize performance.

Without going to the extreme of proposing changes to the environment within which firms operate, an attempt has been made to identify possibilities which might exist to achieve productivity improvement in manufacturing in each region of Canada having in mind the existing industrial structure. The major aim is not to attempt in all regions to match levels of productivity achieved in Ontario or B.C. or again with the Canadian average levels, but rather to attempt to improve productivity performance in all regions, taking into account the different sets of circumstances which exist in each region of Canada.

While prescriptions to improve manufacturing productivity in the lagging regions of Canada are not fast and easy, perhaps specific measures should be taken at the firm level to improve the efficiency with which factors are utilized in production, especially in those industries for which a base already exists and which offer good long-term prospects. In addition, the implementation of broad economic policies to alter the environment will be required to achieve improved productivity performance. For example, competition as well as commercial policies and also financial and technical assistance in the reorganization of existing companies and industries to achieve economies of rationalization, specialization and larger production runs should be brought into play.

The multilateral tariff negotiations in Geneva will offer opportunities to effect major structural and organizational adjustments in the economy of the regions and to achieve significant improvements in productivity and efficiency through reductions in tariff and non-tariff barriers in Canada and other countries. The increased market access which would ensue as a result of further trade liberalization would enable a number of companies to achieve larger scale and more specialization. In anticipation of adjustments in the structure of production resulting from reductions in trade barriers, immediate steps should be taken to establish a program to include provisions for temporary technical, research and perhaps financial assistance, where needed to reorganize and expand production.

Finally, it is clear that the search for opportunities and the development of appropriate policies and programs to achieve the maximum efficiency of human and material resources in the disadvantaged regions of Canada will need to be conducted within a long-run consistent framework and in close co-operation with all levels of government, business and labour.

KP/MDB/dc

December 20, 1976

APPENDIX A

Average Annual Rates of Increase of Value Added (Total Activity) per
Production Worker, by Province and/or Region (1970-73)
(in percentages)

	<u>Atlantic</u>	<u>Quebec</u>	<u>Ontario</u>	<u>Manitoba</u>	<u>Saskatchewan</u>	<u>Alberta</u>	<u>B.C.</u>	<u>Canada</u>
Food & Beverage	11.41	8.06	10.58	10.63	6.87	8.18	11.16	9.79
Tobacco Products		12.21	10.84					11.77
Rubber Products		3.98	7.81	3.30		9.15	10.89	6.74
Leather Products		6.62	8.03	22.94		17.36	14.27	7.93
Textiles		7.71	8.59	5.92	16.67	-2.43	19.68	8.48
Knitting Mills		6.60	10.25	2.57				7.46
Clothing		7.83	10.62	10.62			9.69	8.59
Wood Products	22.47	19.64	18.45	16.78	36.24	24.11	29.47	25.06
Furniture		7.58	9.72	11.24	5.41	14.74	14.00	9.18
Paper & Allied Industries		9.41	8.86	13.75		5.86	7.77	9.97
Printing & Publishing		9.33	12.63	7.30	2.96	12.60	10.54	10.77
Primary Metals		0.68	10.56	14.82		15.11	6.99	8.07
Metal Fabricating		9.88	9.09	12.53	8.86	14.17	8.53	9.22
Machinery		7.74	-3.68	5.63	3.44	4.13	9.16	-1.44
Transportation		1.30	10.75	6.12	0.40	10.71	11.36	10.05
Electrical Products		7.98	12.45	18.30		-4.97	6.08	10.55
Non-Metallic Mineral Products		9.31	10.75	4.26	15.88	7.53	8.45	9.97
Petroleum & Coal Products		16.67	17.60		13.07	3.67	23.58	16.42
Chemicals		12.33	9.13	8.56	7.49	11.91	18.50	10.36
Miscellaneous Manufacturing		7.27	7.57	10.29	4.75			6.95
Total Manufacturing	12.77	7.57	9.34	9.27	10.96	9.70	14.61	9.53

SOURCE: Stat Can. Cat. #31-203, Manufacturing Industries of Canada

APPENDIX "B"

PRODUCTIVITY PERFORMANCE IN CANADIAN MANUFACTURING - 1972

Productivity is the ratio of the output of the production process to the factor inputs required to produce those goods and services. Both output and input may be quantified in a number of ways such that a variety of productivity measures exist. In this exercise, census value added is employed as the measure of output. This value is related to three measures of input; labour capital and a combination of these two factors.

A) Labour Productivity

Five different ratios were calculated for twenty major manufacturing groups:

- 1) Value added (manufacturing activity) per production worker.
- 2) Value added (manufacturing activity) per man-hour.
- 3) Value added (total activity) per employee.
- 4) Value added (total activity) per production worker.
- 5) Value added (total activity) per man-hour.

The summary results are listed in the following table:

TABLE I

Labour Productivity in Canadian Manufacturing by
Province / Region in 1972

	VA 1)		VA 1)		VA 2)		VA 2)		VA 2)	
	PW	Rank	MH	Rank	Empl.	Rank	PW	Rank	MH	Ran
Atlantic Region	14,165	7	7.25	6	11,490	7	15,034	7	7.70	7
Quebec	17,670	5	9.00	4	13,470	5	18,582	5	9.47	5
Ontario	22,040	3	11.26	2	17,021	1	24,061	1	12.30	1
Manitoba	15,919	6	8.32	5	12,327	6	16,706	6	8.73	6
Saskatchewan	22,129	2	11.23	3	16,260	3	23,275	2	11.81	3
Alberta	22,275	1	11.37	1	16,204	4	23,218	3	11.85	2
British Columbia	21,352	4	11.37	1	16,455	2	21,933	4	11.68	4
Canada	20,043		10.28		15,441		21,459		11.00	

- 1) Manufacturing Activity
- 2) Total Activity

B) Capital Productivity

Two ratios were adopted to measure output per unit of capital in each major manufacturing industry in 1972:

- 1) Value added per dollar of mid-year gross fixed capital stock (based on perpetual inventory data first directly, and second, after conversion to man-year equivalent).
- 2) Value added per dollar of annualized mid-year gross fixed capital stock (determined by the average service life of capital).

The results of relating output to each of these measures are contained in Table II.

TABLE II
Capital Productivity in Canadian Manufacturing
by
Province / Region in 1972

	<u>VA¹</u> <u>Capital Stock</u>	<u>Rank</u>	<u>VA¹</u> <u>Capital Stock²</u>	<u>Rank</u>	<u>VA¹</u> <u>Capital Stock³</u>	<u>Rank</u>
Atlantic Region	.253	7	30,777	7	8,083	7
Quebec	.584	2	49,694	2	18,109	1
Ontario	.602	1	51,213	1	18,060	2
Manitoba	.448	3	38,120	3	15,236	3
Saskatchewan	.385	5	32,775	5	14,255	4
Alberta	.417	4	35,471	4	13,760	5
British Columbia	.384	6	32,676	6	11,523	6
Canada	.521		44,324		16,152	

- 1) Total activity.
- 2) Man-year equivalent.
- 3) Annual gross capital stock (fixed gross capital stock divided by the service life of capital).

C) Labour and Capital Combined

A third method of calculating productivity relates output to both capital and labour factor inputs. Two measures of combined factor productivity are presented in the following table:

TABLE III
Output per Unit of Combined Labour and Capital in
Canadian Manufacturing by Province / Region in
1972

	<u>Value Added¹⁾</u> <u>Combined Labour & Capital</u> <u>(Opportunity Cost Basis)</u>	<u>Rank</u>	<u>Value Added¹⁾</u> <u>Combined Labour & Capital</u> <u>(Man-Year Equivalent)</u>	<u>Rank</u>
Atlantic Region	2.732	7	8,366	7
Quebec	6.306	2	10,598	5
Ontario	6.502	1	12,775	1
Manitoba	4.840	3	9,315	6
Saskatchewan	4.166	5	10,868	4
Alberta	4.508	4	11,123	2
British Columbia	4.153	6	10,944	3
Canada	5.629		11,451	

- 1) Total activity.

VALUE ADDED (TOTAL ACTIVITY) PER EMPLOYEE,
BY MAJOR INDUSTRY GROUP - 1972

APPENDIX C-1

(In Dollars)

	<u>Atlantic</u>	<u>Que.</u>	<u>Ont.</u>	<u>Man.</u>	<u>Sask.</u>	<u>Alta.</u>	<u>B.C.</u>	<u>Canada</u>
Food & Beverages	10,736	16,407	19,235	13,957	15,167	16,060	16,565	16,601
Tobacco Products		23,652	33,713					26,726
Rubber Products	5,996	14,402	16,603	9,545	12,484	15,506	12,255	15,516
Leather Products		7,835	8,600	8,171		8,548	9,289	8,198
Textile Products	9,094	10,924	12,985	7,762	12,532	11,757	10,669	11,719
Knitting Mills		9,163	8,288	11,198				8,818
Clothing Mills		7,779	8,073	7,455	8,148		7,618	7,804
Wood Products	8,724	11,044	11,795	9,615	19,262	14,168	16,460	13,676
Furniture & Fixtures		9,815	11,202	9,893	7,355	9,932	10,863	10,490
Paper & Allied		15,921	15,293	14,223		18,175	19,674	16,240
Printing, Publ. & Allied		14,251	14,956	12,903	11,591	14,693	15,166	14,449
Primary Metals		16,851	18,007	14,780		16,101	16,619	17,198
Metal Fabricating		13,762	15,418	12,675	12,035	13,979	15,307	14,763
Machinery	6,732	13,534	15,441	10,844	14,873	14,227	14,621	14,769
Transportation Equip.		13,218	23,490	10,119		12,227	15,197	19,907
Electrical Products		14,954	15,100	12,130		11,344	11,570	14,756
Non-Metallic Minerals	15,672	17,775	18,911	28,775	17,957	22,880	18,448	18,944
Petroleum & Coal		44,428	18,724		40,998	42,684	38,559	30,211
Chemical & Chemical Prod.		18,670	24,665	22,264	20,665	29,964	21,236	22,405
Miscellaneous	8,945	10,681	14,616		9,169	12,618		13,133
T O T A L	11,490	13,470	17,021	12,327	16,260	16,204	16,455	15,441

1) Value added (total activity) - total employees.

Source: Statistics Canada, Manufacturing Industries of Canada,
(Catalogue No. 31-203).

PROVINCIAL VALUE ADDED PER EMPLOYEE
RELATIVE TO CANADA
BY MAJOR INDUSTRY GROUP - 1972

APPENDIX C-2

(In Percentages)

	<u>Atlantic</u>	<u>Que.</u>	<u>Ont.</u>	<u>Man.</u>	<u>Sask.</u>	<u>Alta.</u>	<u>B.C.</u>
Food & Beverages	- 35.33	- 1.18	15.87	-15.92	- 8.63	- 3.25	- .21
Tobacco Products		-11.50	26.15				
Rubber Products	- 61.35	- 7.18	7.01	-38.48	-19.54	- .06	-21.01
Leather Products		- 4.42	4.91	- .33		4.27	13.31
Textile Products	- 22.40	- 6.78	10.81	-33.76	6.94	.33	- 8.96
Knitting Mills		3.92	- 6.01	26.99			
Clothing Mills		- .32	3.45	- 4.47	4.41		- 2.38
Wood Products	- 36.21	-19.24	-13.75	-29.69	40.85	3.60	20.36
Furniture & Fixtures		- 6.43	6.79	- 5.69	-29.88	- 5.32	3.56
Paper & Allied		- 1.96	- 5.83	-12.42		11.92	21.15
Printing, Publ. & Allied		- 2.75	3.51	-10.70	-19.78	1.69	4.97
Primary Metals		- 2.01	4.71	-14.06		- 6.37	- 3.36
Metal Fabricating		- 6.52	4.72	-13.91	-18.25	- 5.05	3.97
Machinery	- 54.41	- 8.36	4.55	-26.37	.71	- 3.67	- 1.00
Transportation Equip.		-33.60	18.00	-49.16		-38.58	-23.66
Electrical Products		1.35	2.34	-17.79		-23.12	-21.59
Non-Metallic Minerals	- 17.27	- 6.17	- .17	51.90	- 5.21	20.78	- 2.61
Petroleum & Coal		47.06	-38.02		35.71	41.29	27.64
Chemical & Chemical Prod.		-16.67	10.09	- .63	- 7.76	33.74	- 5.21
Miscellaneous	- 31.89	-18.67	11.30		-30.18	- 3.92	
TOTAL	- 25.58	-12.76	10.24	-20.16	5.31	4.95	6.57

Source: Statistics Canada, Manufacturing Industries of Canada,
(Catalogue No. 31-203).

MAJOR INDUSTRY GROUP - 1972

(In Dollars)

	Atlantic	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
Food & Beverages	64,453	57,331	54,944	43,256	42,620	55,431	53,841	50,355
Tobacco Products		96,725	82,973					82,784
Rubber Products		129,289	104,371					87,351
Leather Products		152,587	96,319				109,407	98,867
Textile Products	34,937	36,141	35,158					35,715
Knitting Mills		90,317	57,694					76,920
Clothing Mills		317,527	239,037	353,090	151,750		307,117	246,997
Wood Products	72,883	89,123	61,101	37,744		84,817	56,893	58,213
Furniture & Fixtures		132,413	134,752	117,927		130,053	156,567	133,423
Paper & Allied		25,183	28,854					19,276
Printing, Publ. & Allied		73,525	77,594	84,500	58,917	96,376	99,276	74,426
Primary Metals		25,804	24,392					22,705
Metal Fabricating		85,068	73,193	91,997	115,755	115,380	94,059	72,831
Machinery		93,455	81,355	70,531		179,135	127,906	87,362
Transportation Equip.		53,036	75,688	77,118		131,615	118,422	73,099
Electrical Products		87,363	94,076				113,568	90,356
Non-Metallic Minerals	51,911	39,618	34,734	36,468		40,489	30,384	34,942
Petroleum & Coal		12,314	13,337				9,789	12,241
Chemical & Chemical Prod.		36,524	34,980					29,951
Miscellaneous	91,271	103,760	82,040					89,579
TOTAL	30,777	49,694	51,213	38,120	32,775	35,471	32,676	44,324

Source: Statistics Canada Manufacturing Industries of Canada, (Catalogue No. 31-203), Fixed Capital Flows and Stocks, (Catalogue No. 13-211) and Office of Policy Analysis estimates.

PROVINCIAL VALUE ADDED (TOTAL ACTIVITY) PER UNIT OF CAPITAL STOCK
IN RELATION TO CANADA
BY MAJOR INDUSTRY GROUP - 1972 (In Percentages)

	<u>Atlantic</u>	<u>Que.</u>	<u>Ont.</u>	<u>Man.</u>	<u>Sask.</u>	<u>Alta.</u>	<u>B.C.</u>
Food & Beverages	28.00	13.86	9.12	-14.09	-15.36	10.08	6.93
Tobacco Products		16.84	.23				
Rubber Products		48.01	19.49				
Leather Products		54.34	- 2.57				10.66
Textile Products	- 2.17	1.20	- 1.56				
Knitting Mills		17.42	-24.99				
Clothing Mills		28.56	- 3.22	42.96	-38.56		24.34
Wood Products	25.20	53.10	4.97	-35.16		45.71	- 2.26
Furniture & Fixtures		- .75	1.00	-11.61		- 2.52	17.35
Paper & Allied		30.65	49.69				
Printing, Publ. & Allied		- 1.21	4.26	13.54	-20.83	29.50	33.39
Primary Metals		13.65	7.43				
Metal Fabricating		16.81	.50	26.32	58.94	58.43	29.15
Machinery		6.98	- 6.87	-19.26		105.05	46.41
Transportation Equip.		-27.44	3.55	5.50		80.05	62.01
Electrical Products		- 3.31	4.12				25.69
Non-Metallic Minerals	48.57	13.39	.59	4.37		15.88	-13.04
Petroleum & Coal		.60	8.96				-20.03
Chemical & Chemical Prod.		21.95	16.79				
Miscellaneous	1.89	15.83	- 8.41				
T O T A L	- 30.56	12.12	15.55	-13.99	-26.05	-19.97	-26.28

Source: Statistics Canada, Manufacturing Industries of Canada, (Catalogue No. 31-203), Fixed Capital Flows and Stocks (Catalogue No. 13-211), and Office of Policy Analysis estimates.

PROVINCIAL VALUE ADDED (TOTAL ACTIVITY) PER UNIT OF COMBINED LABOUR AND CAPITAL

APPENDIX E-1

(In Dollars)	BY MAJOR INDUSTRY GROUP - 1972							
	Atlantic	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
Food & Beverages	9,281	12,756	14,247	10,552	11,186	12,452	12,668	12,485
Tobacco Products		19,005	23,973					20,204
Rubber Products		12,958	14,325					13,175
Leather Products		7,452	7,895				8,562	7,570
Textile Products	7,215	8,389	9,483					8,824
Knitting Mills		8,319	7,247					7,911
Clothing Mills		7,593	7,809	7,300	7,732		7,433	7,565
Wood Products	7,791	9,826	9,887	7,663		12,140	12,766	11,075
Furniture & Fixtures		9,138	10,342	9,127		9,227	10,158	9,726
Paper & Allied		9,754	9,995					8,814
Printing, Publ. & Allied		11,797	12,539	11,194	9,685	12,749	13,156	12,100
Primary Metals		10,194	10,360					9,786
Metal Fabricating		11,845	12,735	11,140	10,902	12,469	13,165	12,247
Machinery		11,822	12,978	9,429		13,604	13,121	12,633
Transportation Equip.		10,581	17,926	8,946		11,188	13,469	15,641
Electrical Products		12,768	13,014				10,501	12,685
Non-Metallic Minerals	12,037	12,270	12,245	16,084		14,619	11,479	12,284
Petroleum & Coal		9,641	7,789				7,807	8,711
Chemical & Chemical Prod.		12,355	14,379					12,817
Miscellaneous	8,147	9,684	12,406					11,454
TOTAL	8,366	10,598	12,775	9,315	10,868	11,123	10,944	11,451

Source: Statistics Canada, Manufacturing Industries of Canada, (Catalogue No. 31-203), Fixed Capital Flows and Stocks, (Catalogue No. 13-211) and Office of Policy Analysis estimates.

PROVINCIAL VALUE ADDED PER UNIT OF COMBINED LABOUR AND CAPITAL

BY MAJOR INDUSTRY GROUP - 1972

(In Percentages)

	Atlantic	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Food & Beverages	- 25.66	2.17	14.12	-15.48	-10.40	- .26	1.47
Tobacco Products		- 5.93	18.66				
Rubber Products		- 1.64	8.73				
Leather Products		- 1.55	4.30				13.11
Textile Products	- 18.23	- 4.93	7.47				
Knitting Mills		- 5.16	- 8.39				
Clothing Mills		.37	3.23	- 3.50	2.21		- 1.74
Wood Products	- 29.65	-11.27	-10.72	-30.80		9.62	15.27
Furniture & Fixtures		- 6.04	6.34	- 6.15		- 5.13	4.45
Paper & Allied		10.67	13.40				
Printing, Publ. & Allied		- 2.50	3.63	- 7.48	-19.95	5.37	8.73
Primary Metals		4.17	5.87				
Metal Fabricating		- 3.28	3.99	- 9.03	-10.98	1.82	7.50
Machinery		- 6.42	2.73	-25.36		7.69	3.87
Transportation Equip.		-32.35	14.61	-42.8		-28.47	-13.88
Electrical Products		.66	2.60				-17.21
Non-Metallic Minerals	- 2.01	- .11	- .31	30.94		19.01	- 6.55
Petroleum & Coal		10.68	-10.58				-10.37
Chemical & Chemical Prod.		- 3.60	12.19				
Miscellaneous	- 28.87	-15.45	8.32				
TOTAL	- 26.94	7.45	11.57	-18.65	- 5.09	- 2.86	- 4.42

Source: Statistics Canada, Manufacturing Industries of Canada, (Catalogue No. 31-203), Fixed Capital Flows and Stocks, (Catalogue No. 13-211) and Office of Policy Analysis estimates.

APPENDIX "F"

CANADA

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added</u> <u>Employees and Working Owners and Partners</u>
0 - 4	1.15	29.58	.70	10,654
5 - 9	1.96	16.47	1.36	12,105
10 - 19	3.92	15.95	3.06	13,639
20 - 49	9.57	17.17	8.08	14,753
50 - 99	11.17	8.99	10.01	15,662
100 - 199	15.39	6.17	14.68	16,671
200 - 499	21.93	4.09	22.77	18,150
500 - 999	13.33	1.10	15.65	20,514
1,000 and over	17.29	.47	22.28	22,531
T o t a l	100.00	100.00	100.00	17,481

Source: Statistics Canada, Manufacturing Industries of Canada,
(Catalogue No. 31-203)

NEWFOUNDLAND

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added Employees and Working Owners and Partners</u>
0 - 4	1.24	36.48	.77	8,701
5 - 9	1.27	10.25	.75	8,287
10 - 19	3.10	13.93	2.65	12,007
20 - 49	7.65	13.52	8.11	14,885
50 - 99	12.98	10.66	13.10	14,185
100 - 199	73.75*	8.61	74.61*	14,209*
200 - 499		4.92		
500 - 999		.82		
1,000 and over		.82		
T o t a l	100.00	100.00	100.00	14,132

* 100 and over

PRINCE EDWARD ISLAND

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added Employees and Working Owners and Partners</u>
0 - 4	5.03	41.22	3.49	8,194
5 - 9	5.97	17.56	5.50	10,891
10 - 19		16.79		
20 - 49	33.13*	12.98	25.94*	9,246*
50 - 99	24.44	6.87	16.75	8,095
100 - 199		3.82		
200 - 499	31.43**	.76	48.32**	18,159**
500 - 999		0		
1,000 and over		0		
T o t a l	100.00	100.00	100.00	12,121

* 10 - 49

** 100 - 499

NOVA SCOTIA

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added</u> <u>Employees and Working Owners and Partners</u>
0 - 4	1.40	31.39	1.69	16,054
5 - 9	2.47	19.74	1.65	8,872
10 - 19	4.57	16.16	3.73	10,842
20 - 49	9.50	15.23	8.94	12,518
50 - 99	10.37	7.95	9.55	12,245
100 - 199	12.82	4.64	17.49	18,136
200 - 499	23.50	3.71	27.50	15,559
500 - 999	10.45	.66	12.26	15,610
1,000 and over	22.25	.53	17.17	10,263
T o t a l	100.00	100.00	100.00	13,386

NEW BRUNSWICK

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added Employees and Working Owners and Partners</u>
0 - 4	1.25	30.83	.65	7,869
5 - 9	2.02	16.01	1.25	9,431
10 - 19	4.38	15.84	3.60	12,483
20 - 49	9.90	15.84	8.55	13,120
50 - 99	10.94	8.01	9.64	13,391
100 - 199	21.89	7.67	19.79	13,734
200 - 499	24.34	4.43	28.31	17,669
500 - 999	9.78	.85	14.50	22,522
1,000 and over	11.65	.51	12.44	16,210
T o t a l	100.00	100.00	100.00	15,272

QUEBEC

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added</u> <u>Employees and Working Owners and Partners</u>
0 - 4	1.18	28.75	.78	9,830
5 - 9	2.05	16.34	1.68	12,280
10 - 19	4.02	15.68	3.14	11,676
20 - 49	10.62	17.98	8.87	12,485
50 - 99	12.79	9.79	11.07	12,939
100 - 199	15.91	6.18	14.85	13,949
200 - 499	21.41	3.77	24.54	17,136
500 - 999	14.25	1.11	17.98	18,871
1,000 and over	12.69	.40	15.71	18,508
T o t a l	100.00	100.00	100.00	14,948

ONTARIO

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added</u> <u>Employees and Working Owners and Partners</u>
0 - 4	.84	26.32	.48	10,839
5 - 9	1.49	15.48	.97	12,329
10 - 19	3.29	16.57	2.59	14,914
20 - 49	8.08	18.04	6.79	15,932
50 - 99	9.65	9.50	8.57	16,859
100 - 199	14.49	7.13	13.12	17,182
200 - 499	21.46	4.93	20.34	17,990
500 - 999	13.85	1.40	15.84	21,707
1,000 and over	22.68	.64	29.41	24,605
T o t a l	100.00	100.00	100.00	18,974

MANITOBA

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added</u> <u>Employees and Working Owners and Partners</u>
0 - 4	1.72	33.18	1.19	9,826
5 - 9	2.67	16.09	2.00	10,628
10 - 19	5.01	14.93	4.69	13,283
20 - 49	13.39	17.25	13.28	14,100
50 - 99	13.69	8.04	13.79	14,327
100 - 199	20.65	6.26	23.39	16,096
200 - 499	23.71	3.40	23.89	14,320
500 - 999	16.24*	.62	17.69*	15,484*
1,000 and over		.23		
T o t a l	100.00	100.00	100.00	14,214

* 500 and over

SASKATCHEWAN

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added Employees and Working Owners and Partners</u>
0 - 4	3.42	40.92	1.81	10,317
5 - 9	5.33	19.79	3.21	11,771
10 - 19	7.96	14.88	5.32	13,042
20 - 49	16.90	13.39	13.97	16,152
50 - 99	18.19	6.40	17.05	18,311
100 - 199	15.33	2.68	16.64	21,202
200 - 499	30.44*	1.64	41.73*	26,779*
500 - 999		.15		
1,000 and over		.15		
T o t a l	100.00	100.00	100.00	19,533

* 200 and over

ALBERTA

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added</u> Employees and Working Owners and Partners
0 - 4	2.34	33.68	1.62	12,766
5 - 9	4.31	20.32	2.81	12,036
10 - 19	7.51	17.03	6.27	15,380
20 - 49	15.19	15.50	13.88	16,853
50 - 99	14.24	6.46	15.54	20,113
100 - 199	18.90	4.00	20.99	20,472
200 - 499	22.53	2.52	27.37	22,404
500 - 999	11.49	.49	11.52	18,481
1,000 and over	-	0	-	-
T o t a l	100.00	100.00	100.00	18,441

BRITISH COLUMBIA

VALUE ADDED PER EMPLOYEE OF MANUFACTURING ESTABLISHMENTS

BY SIZE GROUP - 1973

<u>Number of Employees</u>	<u>% of Employees</u>	<u>% of Establishments</u>	<u>% of Value Added</u>	<u>Value Added</u> <u>Employees and Working Owners and Partners</u>
0 - 4	1.74	36.73	.93	10,935
5 - 9	2.68	17.71	1.69	12,933
10 - 19	4.61	14.95	3.36	14,927
20 - 49	10.04	14.28	8.68	17,732
50 - 99	11.15	7.14	11.18	20,560
100 - 199	14.36	4.31	16.53	23,608
200 - 499	25.19	3.65	27.86	22,681
500 - 999	11.90	.85	13.07	22,531
1,000 and over	14.40	.39	16.59	23,625
T o t a l	100.00	100.00	100.00	20,512

APPENDIX "G"

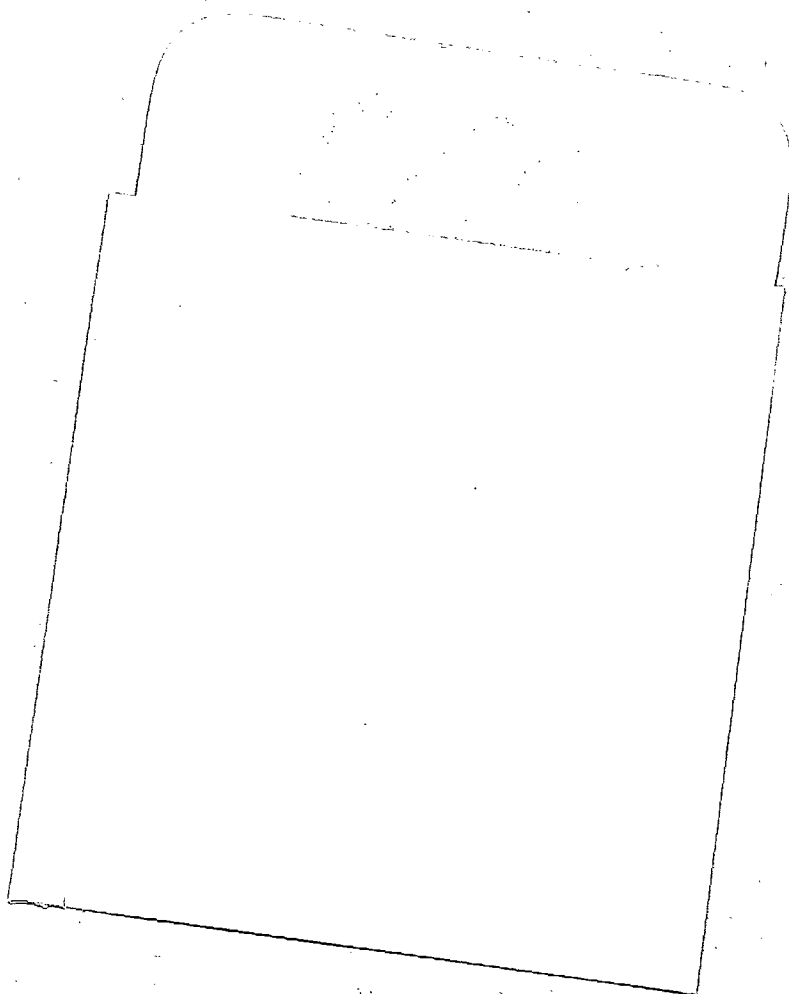
GROSS CAPITAL STOCK PER PRODUCTION WORKER

MAJOR MANUFACTURING GROUPS, BY PROVINCE - 1972

(In Current Dollars)

	<u>Canada</u>	<u>Atlantic</u>	<u>Quebec</u>	<u>Ontario</u>	<u>Manitoba</u>	<u>Saskatchewan</u>	<u>Alberta</u>	<u>British Columbia</u>
Food and Beverage	43,006	25,258	37,226	46,876	41,764	46,836	38,792	42,596
Tobacco	41,685		31,379	49,491				
Rubber and Plastics	20,727		12,321	18,188				
Leather	8,203		5,044	9,165				8,378
Textile	34,576	36,703	32,174	38,502				
Knitting Mills	10,958		9,467	14,169				
Clothing	3,188		2,488	3,400	903	5,005		2,503
Wood	23,679	16,374	11,745	19,666	26,310		18,792	29,663
Furniture	8,181		7,451	8,758	8,774		8,900	8,102
Paper & Allied Products	92,157		67,516	58,074				
Printing & Publishing	29,769		27,627	30,973	22,180	27,208	21,587	24,964
Primary Metals	83,658		76,878	79,551				
Metal Fabricating	22,180		17,608	23,009	15,911	12,461	13,488	18,482
Machinery	21,940		20,203	24,334	18,331		11,042	14,465
Transportation	29,735		29,717	32,977	16,992		10,346	14,287
Electrical	22,185		25,534	21,016				16,110
Non-Metallic Minerals	60,243	46,014	51,237	59,024	85,853		63,499	72,480
Petroleum and Coal	455,969		453,129	447,445				470,610
Chemicals	124,380		93,347	115,598				
Misc. Manuf.	17,668	15,480	11,359	22,440				
T O T A L	40,792	59,226	31,286	39,382	37,847	59,502	55,396	59,053

Source: Statistics Canada, Fixed Capital Flows and Stocks (13-211)
and Manufacturing Industries of Canada (31-203)



INDUSTRY CANADA/INDUSTRIE CANADA



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