

## Industrial Type and Dependence on the Montreal Economy

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## INDUSTRIAL TYPE AND DEPENDENCE ON THE MONTREAL ECONOMY <sup>1</sup>

In an earlier paper of *Les Cahiers de Géographie de Québec*, Brooks, Gilmour and Murrice (1973) examined the spatial linkages of manufacturing in Montreal and its surroundings. Several aspects of inter-industrial material linkages as they relate to the agglomerative force of the Montreal economy were examined. The authors concluded that external economies of scale in the procurement of inputs and the distribution of outputs to other firms in the Montreal industrial complex do not play a prominent role in explaining the high locational preference of firms for the Montreal area. However, this conclusion referred to manufacturing considered as a whole. Examination of the size of firms permitted some modification of the general finding above. The authors concluded that when firms are considered in terms of their size it appears that the agglomerative force of Montreal in regard to the interchange of materials between firms increase as the firms become smaller. Small firms in Montreal have stronger connections with the local industrial economy than do larger firms, a circumstance which suggests that external economies of scale exert an increasing locational pull as the size of the firm diminishes. In almost every respect, small establishments (1-25 employees) revealed linkage patterns distinct from those of larger firms. This distinctiveness was especially marked for small firms in central Montreal. It was concluded that this point in particular, but also other findings of the paper were deserving of further considerations.

It is the purpose of this note to extend the analysis of the 1973 paper published in this journal by 1) examining a facet of industrial linkages in Montreal which was deliberately ignored in it, namely the relations between industrial type and strength of industrial linkages with the Montreal economy, and 2) relating, if possible, the findings to those of the 1973 paper.

The data used in the analysis are the same as those used in the 1973 paper, and consist of linkage information collected from a sample of manufacturing firms located within 55 kilometres of downtown Montreal. In this case analysis is limited to Montreal's central core and suburbs. Of the 154 plants sampled in these two areas, 126 provided the requisite data for this extension of the analysis. Details of the sampling procedure may be found in the earlier paper.

### THE GENERAL SITUATION

In his study of manufacturing in Philadelphia, Karaska (1969) found that a manufacturer's dependence of the Metropolitan area for production inputs varied from one industrial group to another. Similarly, Field and Kerr (1968) discovered that manufacturing establishments in Toronto's

periphery exhibited differences in the strength of their output linkages on the basis of their industrial type. It seems likely, therefore, that different industrial groups in Montreal will vary in terms of their strength of linkage with the Montreal economy.

**Table 1**  
*Strength of Linkages with Montreal by Industrial Group*

<i>Industrial Group</i>	<i>% of sales to Montreal</i>		<i>% of purchases from Montreal</i>	
	<i>unweighted</i>	<i>weighted</i>	<i>unweighted</i>	<i>weighted</i>
food & beverages	59.0	34.1	30.8	7.7
tobacco products	11.0	11.0	50.0	50.0
rubber	60.3	51.5	55.0	44.1
leather	45.0	34.7	44.1	36.4
textiles	46.4	39.7	26.7	42.3
knittings mills	28.0	25.3	45.0	48.9
clothing	38.0	23.4	49.1	40.1
wood	48.5	45.0	51.1	54.7
furniture	36.2	22.6	63.2	65.9
paper & allied	58.6	66.9	40.2	49.3
printing & publishing	76.0	60.7	61.3	26.9
primary metal	36.3	35.2	45.8	47.0
metal fabricating	22.3	18.7	27.0	20.9
machinery	4.4	1.1	34.6	35.0
transportation eqpt.	24.0	8.7	32.7	18.4
electrical products	26.7	22.0	25.6	23.8
non-metallic minerals	61.1	47.2	47.8	52.5
petroleum & coal	27.4	38.9	26.2	14.0
chemical	24.1	13.1	30.0	13.0
miscellaneous	52.4	36.2	27.6	12.9

The average sales and purchase linkage values for each of the manufacturing groups in Metropolitan Montreal were calculated and appear in Table 1. Clearly, dependence on the local economy varies considerably from one industrial group to another. When the weighted sales linkages (weighted linkages take account of the size of establishments) are examined, it is seen that dependence on Montreal can vary from a high of over 50% in the case of the rubber, printing and paper groups, to less than 15% with the chemical,

tobacco, machinery and transportation equipment industries. Similarly wide variations are found in the purchase linkages.

#### LINKAGES, INDUSTRIAL TYPE and LOCATION

The above evidence should be considered in relation to the idea advanced by Vernon (1957) and Steed (1973) that the location of a manufacturing establishment within a metropolitan area is to some extent related to the industrial activity in which it is engaged. For example, Vernon noted that the manufacturers which had the greatest affinity for the central-city core were primarily involved in manufacturing products, « . . . where raw materials are unstandardized or constantly changing : where the processes involved are in continual flux : where the end product is not standardized. » (Vernon, 1957, p. 22). He cited as examples the clothing, printing and miscellaneous manufacturing groups.

For any metropolitan area, given that a difference in the strength of industrial linkages by manufacturing group exists, and that its central city and suburbs have significantly different industrial mixes, it would seem likely that the manufacturing establishments of these two areas would vary in the reliance that they place on that agglomeration. We know that different industrial groups in Montreal rely on the Montreal economy to different degrees. Hence, if the core and suburbs of Montreal have substantially different industrial structures, there is a group probability that there exists the basis of an additional explanatory factor for the different linkage pattern of central city and suburban manufacturing in Montreal.

Table 2 shows the distribution of manufacturing establishments in both Montreal's central core and suburbs by industrial groups. The industrial groups are ranked according to the percentage of their establishments found in the centre. A dichotomy emerges. Fifty per cent of the groups (10 out of 20) have more of their establishments in the centre than in the suburbs, while the other 50% have a majority of their establishments in the suburbs. At one extreme is the clothing industry with 95.6% of its establishments in the centre and at the other extreme is the petroleum and coal products group with none of its establishments in the centre. Clearly there is a marked difference between the center and the suburbs in terms of their industrial structures. Table 3, representing a tabulation of all new manufacturing establishments which located in Montreal between 1960 and 1970, shows that the difference has been growing. The only exception which seems to be emerging is the Furniture and Fixtures group which is reducing its reliance on the centre and turning to the suburbs.

A most significant aspect of the structural differences between the centre and the suburbs is the former's possession of a preponderance of the labour intensive industries, and the latter's possession of a majority of the capital intensive industries. No precise definitions can be fitted to the terms labour intensive and capital intensive, and it would be totally valueless to try to fit all industries into one or the other category. Labour intensive industries

are simply those which place a strong reliance on labour inputs relative to capital inputs, while the opposite is the case with capital intensive industries. There is no sharp dividing line between them, but rather there is a gradual progression from industries making a great relative use of labour through to those which make a very low relative use of labour. Complete data on the use of factor inputs by industry are not available and only indirect means can be employed to give some indication of the labour or capital intensity of industries.

Table 2

*The Location of Manufacturing Establishments in Metropolitan Montreal by Industrial Group, 1970*

<i>Industrial Group</i>	<i>Centre</i>		<i>Suburbs</i>	
	<i>No. of estab.</i>	<i>% share of total estab</i>	<i>No. of estab.</i>	<i>% share of total estab.</i>
clothing	1 153	95.6	53	4.4
leather	132	84.6	24	15.4
knitting mills	144	84.4	21	15.6
textiles	196	76.3	61	23.7
printing & publishing	443	70.0	190	30.0
miscellaneous	362	67.8	172	32.2
food & beverage	303	63.3	176	36.7
tobacco	6	60.0	4	40.0
furniture & fixtures	222	56.6	170	43.4
rubber	10	55.6	8	44.4
chemical	101	46.5	116	53.5
paper & allied	47	43.9	60	56.1
metal fabricating	249	43.8	319	56.2
electrical products	47	39.5	72	60.5
non-metallic mineral	44	37.0	75	63.0
primary metal	13	36.1	23	63.9
machinery	25	33.3	50	66.7
transportation eqpt.	21	30.0	49	70.0
wood	25	25.8	72	74.2
petroleum & coal	0	0.0	13	100.0
TOTAL	3,515	67.0	1,728	33.0

Sources : Table derived from information given in : *Manufacturing Industries of Canada : Geographical Distribution*, 1970, Ottawa : Statistics Canada, 1974, and *Scott's Quebec Industrial Directory, 1969-1970*, 4th ed. Oakville: Penstock Publications Limited, 1970.

Table 3

***The Locational Patterns of New Manufacturing Establishments  
Entering Metropolitan Montreal Between 1960 & 1970***

<i>Industrial Group</i>	<i>Centre</i>		<i>Suburbs</i>	
	<i>No. of new estab.</i>	<i>% share of new estab.</i>	<i>No. of new estab.</i>	<i>% share of new estab.</i>
2 – Tobacco Products	1	100.0	0	0.0
3 – Rubber	1	100.0	0	0.0
7 – Clothing	214	92.6	17	7.4
6 – Knitting Mills	35	89.7	4	10.3
4 – Leather	16	72.7	6	27.3
11 – Printing & Publishing	74	65.5	39	34.5
5 – Textiles	22	62.9	13	37.1
1 – Food & Beverages	26	60.5	17	39.5
20 – Miscellaneous	51	52.6	46	47.4
17 – Non-Metallic Mineral	12	48.0	13	52.0
14 – Machinery	11	47.8	12	52.2
9 – Furniture & Fixtures	21	45.7	25	54.3
19 – Chemicals	10	41.7	14	58.3
10 – Paper & Allied	5	35.7	9	64.3
15 – Transportation Eqpt.	7	35.0	13	65.0
13 – Metal Fabricating	31	30.4	71	69.6
16 – Electrical Products	6	27.3	16	72.7
12 – Primary Metal	2	25.0	6	75.0
8 – Wood	2	10.5	17	89.5
18 – Petroleum & Coal Prod.	0	0.0	2	100.0
TOTAL	547	61.7	340	38.3

Source : Table derived from information given in : *New Manufacturing Establishments in Canada*, June 1970, Ottawa : Statistics Canada, July, 1970.

As a general rule, the greater is the labour intensity of an industry, the lower is the relative importance of capital in production. This being so, labour intensive industries should make a relatively low utilization of fuel and power. We would expect the value of fuel and power consumed per employee in labour intensive industries to be considerably lower than in capital intensive industries.

When this rough indicator of labour intensity is employed for Montreal we find sharp differentiation between the ten industrial groups with a majority of their plants in the centre (centre-dominant) and the other ten industrial groups with a majority of their plants in the suburbs (suburban-dominant). For the centre-dominant industries the average values of fuel and electricity consumed per production employee in 1970 was \$211, whereas the corresponding figure for suburban-dominant industries was \$523. Within the first grouping certain industrial groups, which are universally regarded as labour intensive industries, recorded much lower figures. For example in clothing, the figure was \$45.56, in leather industries it was \$65.96, and for knitting mills it was \$119.43. Amongst the suburban-dominant industries some very high figures were recorded, e.g. non-metallic mineral industries with \$1688.67 per production employee and the chemical industries with \$1144.32.

Another very significant difference between the centre-dominant and suburban-dominant industries is found in the size of their production facilities. In general, the establishments of the former are smaller than those of the latter. The average number of production workers per establishment amongst the centre-dominant industries was 30 in 1970, while amongst the suburban-dominant industries it was 55

The final difference to be remarked upon is the linkage patterns of centre-dominant and suburban-dominant industries. From a perusal of Table 1, it would appear that on the whole, the centre-dominant industries have a stronger set of industrial linkages with Metropolitan Montreal than do the suburban-dominant industries. In an attempt to provide some sort of a quantitative measure, all the centre-dominant industries were grouped together and average values for their output, input and total linkage figures were derived. A similar operation was performed on the suburban-dominant industries. Table 4 shows the results.

**Table 4**

***A Comparison of the Strength of Industrial Linkages with Metropolitan Montreal Between Centre-Dominant Industries and Suburban-Dominant Industries***

<i>Industry Type</i>	<i>% of sales to</i>		<i>% of purchases</i>		<i>% of total linkage</i>	
	<i>unweighted</i>	<i>weighted</i>	<i>unweighted</i>	<i>weighted</i>	<i>unweighted</i>	<i>weighted</i>
Centre-dominant	47.6	34.6	43.5	35.1	45.6	34.9
Suburban-dominant	33.3	29.7	36.1	32.9	34.7	31.3

Quite clearly, the centre-dominant industries have stronger industrial linkages with Montreal than do the suburban-dominant industries. This is especially the case with sales linkages. The reader will observe that weight-

ing reduces the differences between the two groups. This is only to be expected because weighting reduces the strength of small establishments in affecting the general results. Since small establishments are relatively more numerous in centre-dominant industries, and since in general they have stronger connections with the local economy than large establishments, the effect of weighting is more strongly felt in centre-dominant as compared to suburban-dominant industries.

## CONCLUSIONS

The following main points emerge. Industrial groups in Montreal belong to two major categories defined in terms of distributional pattern. One category consists of industries with a majority of their plants in the central core, while the other category consists of industries with a majority of their plants in the suburbs. The first category is dominated by labour intensive industries and small plants, and the other by capital intensive industries and larger plants. Finally, the first category has stronger linkages with the Montreal economy than does the second category, a circumstance which suggests that Montreal offers more external economy benefits to some industries than it does to others.

These findings provide some extension of our knowledge of manufacturing's linkages in Montreal, and at the same time provide some new dimensions to one of the major findings of the Brooks, Gilmour, Murrice paper (1973). This paper observed the unusually strong connections between small plants (1-25 employees) in Montreal's central core and the Montreal economy. This tendency is without doubt partly a function of smallness itself. But as a result of the evidence derived from this examination of the relations between industrial type and linkage with Montreal, it seems this tendency of small central plants (79.60% of all plants in the City of Montreal have less than 50 employees) is also related to the circumstance that so many of them belong to the centre-dominant industries which tend towards labour intensity and to stronger connections with the local economy.

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