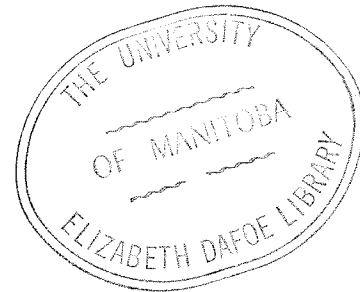


THE ROLE OF STAPLE PROCESSING
AS A
FACTOR IN THE REGIONAL ECONOMIC GROWTH
OF THE PRAIRIE PROVINCES

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ABSTRACT

THE ROLE OF STAPLE PROCESSING AS A FACTOR IN THE REGIONAL ECONOMIC GROWTH OF THE PRAIRIE PROVINCES

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The exploitation of Canada's vast national resources has long been recognized as a major contributing factor to the economic growth and development of the nation. However, these resources are not spread evenly over the length and breadth of the country, nor do they all require the same effort or amount of activity to convert them into a saleable staple product that can be transported and marketed either in Canada or throughout the world. This study is an examination of the role of staple exploitation in the Prairie Provinces of Canada, and particularly the economic benefits to that region of processing or manufacturing the raw staples locally before they are exported.

The study falls roughly into two broad sections. The first section, consisting of the Introduction and Chapter I and II, contains an examination of the historical importance of the staple wheat in the development of the Prairie Region and compares this with the effects of the exploitation of other more extensively processed resource staples, such as pulp and paper and metallic minerals, on the economy of Central Canada. The second section, consisting of Chapters III and IV, contains an examination of the consequences on the Prairie Region of developing more highly processed agricultural staple products for export. By means of a detailed survey of the specific effects of the raising of livestock and expanding the meat processing industry in Manitoba, some conclusions are drawn about the economic consequences

of the processing of this staple product on the entire Prairie Region.

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INTRODUCTION

The Regions of Canada

Canada traditionally has been thought of as being comprised of a number of regions which can be differentiated from various points of view such as geography, topography, climate and culture. The number of regions and their boundaries tend to vary depending upon the purpose for which the regions are being delineated and the discipline and experience of the individual making the definition. Within the context of a single discipline, such as economics, the definition of regions in Canada can and does vary from the concept of the nation as a single region to each province or sub-division of a province as a region. From the foregoing it is obvious that, while being based on some clearly defined physical or cultural criteria, the regions of Canada can be defined in different ways depending upon the use which is to be made of the particular regional concept.

In the present analysis we are concerned with economic growth and development based primarily upon the massive exploitation of a relatively few staple raw materials and their exportation, in a more or less refined state, to export markets beyond the national boundaries of the country. It follows then that the division of Canada which is most useful is that which distinguishes regions by the homogeneity of their productive resources. If the productive resources of two adjacent provinces are similar or are such that they have a comparative advantage in the same type of goods, they should be included in the same region. With this as a criterion the country has been divided into five regions.¹ Starting from the east, the first region is comprised of the Maritime

¹ For a full discussion of the regional breakdown of Canada in this context see Caves and Molton (19, pp. 144-147).

Provinces and Newfoundland (since it came into the Canadian union in 1949) and will be known as the Atlantic Provinces. The second region is designated as Central Canada and consists of the provinces of Quebec and Ontario. The third area, comprised of the provinces of Manitoba, Saskatchewan and Alberta, shall be known as the Prairie Region. The province of British Columbia will comprise a single area which shall be termed the Pacific Region. Finally, the northern area of the Yukon and the Northwest Territories will comprise the fifth or Northern Region.

While it is recognized that within the context of the purposes for which the five regions have been defined here, a case can be made for not having the provincial boundaries delineate the regional boundaries, nevertheless, provincial boundaries have been used. In part this was done because of the difficulty of defining boundaries other than provincial borders which are consistently meaningful from the point of view of economic development. In part the political boundaries are meaningful to a significant degree because of the influence of politics on the course of economic growth. Caves and Holton pointed this out in their study of the Canadian economy, when they noted that the sharpest boundaries are generally those between nations, so it is appropriate to give primary attention to questions raised by national policies and international boundaries. Many of the aspects of international boundaries, however, apply to boundaries between provinces, federal states, or even smaller administrative units such as municipalities. Their difference in significance is largely a matter of degree. (39, p. 216).

Although all five regions have and will continue to contribute

in varying degree to the economic growth of the nation, this analysis is particularly concerned with the contribution, development and inter-relationships of Central Canada and the Prairie Region. For this reason the factors underlying the choice of these two areas as regions will be elaborated. The Prairie Provinces are a well defined region geographically with the Pre-Cambrian Shield on the east and north; the Rocky Mountains on the west and the international border on the south. The entire area was opened for settlement and exploitation in a relatively short period of time following the completion of the Canadian Pacific Railway in 1885. The relatively homogeneous physical and climatic character of the region allowed for the early and continuous concentration on the raising of wheat for export. This in turn has meant that the economy of the region to a considerable degree has been dependent on demand for this major staple in distant urban export markets. It must be noted, however, that there are differences in the economic characteristics of the three provinces making up the Prairie Region which have tended to make Saskatchewan the predominant wheat area, Alberta a more diversified economy because of coal, oil and gas, and Manitoba the manufacturing and commercial centre of the prairie market. On the basis of such evidence one might consider that the area is not one region but three or perhaps more. However, the differences tend to complement each other drawing the three provinces together into an economic whole. For example, Veyret has characterized the Prairie Provinces economically as a "true family" with Manitoba the elder and more sedate son and Saskatchewan and Alberta being twins, Saskatchewan impetuous and rough, Alberta slower but more solid (68, p. 31).

In the case of Central Canada, if the non-economic characteristics of Ontario and Quebec are set aside the similarity of the two provinces becomes readily evident. In both provinces the early economic activity consisted of the exploitation of furs and later timber. Agriculture followed the same pattern throughout the region, starting with subsistence farming, then concentrating on supplying the needs of the timber camps, followed by the production of wheat and dairy products for export, and finally as urban centres developed, the pattern of agriculture shifted to supply their needs, particularly for the less transportable more perishable foods. As the other parts of Canada developed, both provinces began to concentrate on providing the materials and goods and materials required in these newly settled areas of the country, rather than concentrating exclusively on products for export markets. Subsequently, the region has become the industrial heartland of the country wherein hydro-electric power, pulp and paper and mineral exploitations are important.

The relative merits of considering the Prairie Provinces and Central Canada as two separate economic regions has been evaluated more fully by other writers on Canadian economic development.² However, it is believed that sufficient evidence has been shown here to indicate that they are areas which from the viewpoint of the economic growth and development of Canada can be considered as separate and distinct regions.

An Appropriate Theory of Canadian Regional Growth

The concept of regional economics and the analysis of local economies has attracted a good deal of attention since World War II,

2 For example see: W.A. Mackintosh (52) and R.D. Howland (40).

particularly in the United States, although little has been written or said about the determinants of regional growth. This is understandable when it is considered that the growth of a regional economy in some manner is a function of the growth of larger national and international economies (of which it is a part) which are also imperfectly understood. Although there are a number of theories which explain particular aspects of economic growth, or economic growth under particular circumstances, there is no widely accepted general growth theory.³ In this respect the statement Simon Kuznets made on this subject nearly a decade ago is still relevant:

We do not have a tested theory of the economic growth of nations which demonstrates that long term changes in national product invariably follow a specific pattern expressible by a given curve; that this pattern is securely founded upon a causal explanation that traces it to underlying factors that in turn display persistent patterns of change -- say trends as clear-cut and as invariant as in the growing processes of a biological species (47).

In the absence of a general growth theory, attention has been devoted to the causes and determinants of regional economic growth. This work has tended to crystallize into two major schools or groups of theories which can be referred to as a "stages theory" and a "staple theory".

Edgar M. Hoover, one of the chief proponents of the stages theory of regional growth, has summarized that theory in the following manner. As a rule, regions are initially self sufficient because of high transport costs. Higher living standards are brought about only

³ For a current general discussion of one aspect of economic growth and development see Colin Clark (20).

when trade develops, and trade must await "reduction of transfer costs and increasing specialization of production, involving shifts of resources to new uses" (39, p. 189). Since agricultural output in a given geographical area has a limit even if more intensive methods are used, the argument runs, incomes cannot rise indefinitely without turning to industries other than agriculture. Similarly limitations apply to forestry and fishing but not to manufacturing nor to mining which exploits ground resources in all dimensions (40, pp. 181-182). It follows from the foregoing that if a region is to show a continual increase in per capita income over time with a rising population it must eventually industrialize. This would imply that even countries such as Denmark and New Zealand, which have engaged in highly specialized agricultural production for export, must eventually industrialize if growth is to continue (19, p. 142ff.)

Although the concept of economic growth through staple exploitation was conceived and fully developed by H. A. Innis, the relative merits of the staple theory versus the stages theory as an explanation for regional growth particularly in North America were explored by A.F.W. Plumptre and Douglas C. North. These writers noted that the stages theory does not fit the facts in many areas of Canada and the United States. Many regions in these countries never went through a self sufficient stage but were opened originally to exploit some basic staple product for export which was exchanged for imported goods to support those engaged in the basic staple industry (59, pp.389-507). For example, the Pacific Northwest was initially exploited by exporting furs, then wheat and then lumber (58, pp. 243-258). Corbett cited the

prairie region of North America where favourable factors of technology, resources and markets made possible the inflow of population directly into primary production for export. It was the export of primary staples which made possible the importation of capital and other goods which in turn were the basis for further agricultural expansion and any industrialization which finally took place (21, pp. 360-368).

The staple theory then is more appropriate for regions which were virtually uninhabited prior to the development of an export staple, as were many of the regions of North America. But it is broader than this in concept, for even a region which is originally self sufficient may shift to production for export as transfer costs fall and so become dependent on an export staple for further growth. Of the two theories, the staple theory really puts more emphasis on the development of a major export staple as the underlying dynamic cause of growth. Also, the two theories conceive of a mature economy in a different manner. North argues that a region may remain dependent on exports indefinitely with per capita income rising secularly. On the other hand, the stages theory implies a trend towards a regionally self sufficient economy and that regions which are not nearly self sufficient are in a kind of disequilibrium.

Within the context of the past regional economic growth of Canada, the staple theory appears to fit the pattern of development much more closely than the stages theory. As Caves and Holton noted, the staple theory presupposes that transportation costs are lowered enough to permit trade among regions and between regions and foreign countries.

The regions of Canada were opened up by means of new transportation routes and techniques which lowered transportation costs. Thus it has often been said that the history of Canada is the history of transportation. This common observation strongly implies that the staple theory is the more important vehicle for the analysis of Canada's regional growth.⁴

The staple theory appears to be equally if not more applicable to any speculation about the future economic growth of the regions of Canada. The stages theory, on the other hand, contains certain theses which are not compatible with current and probably future levels of technology, production and trade. For example, the closed economy assumptions are not realistic for most nations at present. They may have been realistic in the past when transportation was primitive and costly but they cannot be used to explain the growth of Canada or any of the young nations of the world now or in the future when the technology of transportation and communication almost precludes isolated development. Furthermore, the application of modern technology to production can lead to more intense specialization among nations and even regions than in the past.⁵ Such specialization implies trade, hence isolated development may be less likely now simply because of production techniques. For all these reasons, the staple theory of regional growth is considered to provide a logical basic theory for understanding both the history of the regional economic growth of Canada and the implications for the future trends of development.

4 Much of the following description of the relative merits of the staple theory as an explanation for regional development is based on the findings of Caves and Holton (19, p. 144 and following).

5 It is noted that under certain conditions, the application of new technologies can reduce a nation's existing comparative advantage in a specific field of activity.

Within the context of this view of the forces making for regional growth, one factor stands out as being perhaps most important and that is trade. The importance of this was stressed by Hoover when he stated that an advance to higher living standards requires more trade. Such trade permits each locality to share, to some extent, the production advantages of other localities and to attain a better consumption standard by concentrating on the lines of production in which it has the greatest relative advantage. The essentials for increasing trade are reduction of transfer costs and increased specialization of production, involving shifts of resources to new uses (39, p. 188). Similarly, Walter Isard recognizes the importance of trade to regional growth, although somewhat less emphatically, when he noted that, within the limits imposed by transportation costs, political and cultural barriers, etc., individual regions of a system can draw freely on the resources, products and skills of other regions in their efforts to develop their industries and raise their own incomes. The goods and services a region imports must be paid for in the long run by exports or by transfer of assets, including bank reserves. Viewed from the other side of the coin, a region's exports provide the wherewithall for its imports and accumulation of assets (46, p. 122).

It is within the above described theoretical framework of economic growth that the regional development of Canada and the particular place of staple processing in that regional development will be examined. The starting point for this examination will be the period immediately after Confederation and the acquisition and opening by Canada of the Prairie Region. For as W.A. Mackintosh pointed out, prior to the latter

part of the nineteenth century, all the regions of Canada shared in both the export and home markets. It was the development of the export oriented Prairie Region and the greater development of manufacturing in Central Canada that started the trend to economic regionalism in Canada (53, p. 36).

Foundation of the Prairie Economy

In a new and virtually undeveloped nation, such as Canada was at Confederation, rapid economic progress depends upon two basic factors. Firstly, the discovery and development of cheap supplies of raw materials for export and in return the importation of materials and manufactures which could not be produced economically at that stage of production. Secondly, the ability to import capital requirements, technical knowledge and equipment from older more highly developed countries. In addition the rate of expansion can be profoundly affected by major improvements in productive equipment, practices and organization, as such improvements can serve to make hitherto useless resources highly valuable, or by reducing the costs of transportation make new previously unattainable markets profitable (53, p. 11).

Through the annexation of the Prairie Region and the subsequent development of wheat for export the economic expansion of Canada for about five decades after Confederation was accelerated in much the manner described above. All the factors described were present. For example, the export market was primarily in Europe, the source of capital primarily Europe and of technical knowledge and equipment in part Europe and to an increasing degree The United States. However, the development of

the Prairie Region in this context, its relations with Central Canada and the consequent effects on both of these regions will be dealt with later.⁶ Our purpose here is to outline the economic position of the Prairie Region in relation to the Canadian economy.

For several decades prior to Confederation the nascent economy of the largely unsettled Prairie Region tended to a north-south orientation and traded with the United States, as did much of the rest of Canada. The Colony at the Red River was established in 1812 and was the centre of a conflict between the rival fur trading organizations -- the Hudson's Bay Company and the North-West Company -- until they merged in 1821. After that the colonists supported themselves by supplying foodstuffs and equipment to the Hudson's Bay Company and to an increasing degree by trading in furs privately with American Red River settlements to the south against company regulations. Further to the west, in what is now British Columbia, the trade initially was almost exclusively with the United States. In fact, the disappearance of British preferences in the 1840's tended to foster trade with the United States in all parts of Canada. This led to a movement for reciprocity in trade with that country in the late 1840's which finally resulted in the Reciprocity Treaty of 1854 (19, p. 20).

However, by the late nineteenth century when the Prairie Region entered into its major period of settlement and development the north-south pattern of trade was replaced by an east-west trade pattern, and the pull of the American economy was, for a time, largely offset by the markets in Britain and Europe, tariffs and the "national policy" of the federal government.⁷ By 1911 the Prairie Region was a well developed area

⁶ See Chapter I, particularly pp. 36-42 and 65-69.

⁷ For a more detailed discussion of this point see Chapter I, pp. 27-30.

comprising three provinces whose principle economic activity consisted of producing a single agricultural export staple, wheat, even though there were certain differences in each province. In Manitoba 46% of the improved land was sown to wheat compared with 44% in Saskatchewan and 38% in Alberta. In all three provinces there was about half as much acreage sown to oats as to wheat. Even at this early stage Alberta had a much more diversified and balanced form of agriculture than the other provinces as cattle, sheep and hogs were much more important relative to wheat. The difference in the dependence of the three provinces on agriculture was also reflected in the fact that in Manitoba only 39% of the work force was in agriculture compared with 63% in Saskatchewan and 53% in Alberta. Conversely, Manitoba, the oldest province, was also the distribution and manufacturing centre of the region and 10% of the work force was in manufacturing compared with 4% in Saskatchewan and 6% in Alberta. The proportion of the work force engaged in trade and merchandising was 13%, 7% and 9% respectively. The manufacturing activity was primarily fabricating and processing to serve the needs of the residents of the area and consisted of railway shops, lumber mills, brick plants, flour mills and meat-packing. Little processing was done for the export market except for some flour milling and, on an intermittent basis, meat-packing.

By 1921, the situation had changed somewhat. Although wheat accounted for about the same portion of the total cultivated land as a decade earlier, it was proportionately less important in Manitoba and more important in the other two provinces. In Manitoba a definite substitution of feed grains for wheat had occurred, the wheat acreage

⁸ See Census of Canada (10) for 1911, particularly Vol III - Table I and Vol. VI - Table I.

had declined in absolute terms and the number of cattle, horses, hogs and sheep increased substantially. However, livestock was still not as important relative to grain as in Alberta (19, pp. 202-203).

In spite of the differences in the structure of the economies of the three prairie provinces, by the 1920's they were a vast agricultural area in which raising wheat for export was by far the most important activity. The growth of the region since the turn of the century had been little less than startling. For example, in 1921 the region contained 22% of the total population of Canada. It accounted for nearly half the increase in the total population of Canada between 1901 and 1921 and half the increase in farm investment. However, the area only received 6% of the increase in manufacturing and 9% of the increase in central electrical stations during the same period.

At the same time the Central Canadian region had 60% of the nation's population, which had increased by some 4.1% between 1901 and 1921. Although the region had only obtained 40% of the increase in the country's farm investment it received 80% of the increase in manufacturing and central electric stations (10, 1901 and 1921). By 1920, the initial explosive period of development of the Prairie Region's economy was largely over and its position relative to the rest of Canada tended to stabilize for the next decade at least as shown in Table I below. The relative position of each of the provinces in the Prairie Region during the same period is shown in Table II.

As a result of the growth of the prairie economy, wheat was the largest export from Canada and tended to be "the central dynamic and

TABLE I
INDUSTRIAL OUTPUT, CANADA, 1920 TO 1929
 (Percentage of Total Canadian Net Production
 of Certain Industries by Regions)

	<u>1920</u>	<u>1926</u>	<u>1927</u>	<u>1928</u>	<u>1929</u>
Prairie Region					
Agriculture	37.3	48.0	51.0	47.9	35.7
Manufacturing	7.4	7.7	7.6	7.9	7.3
All Industries	20.7	23.7	25.6	24.0	16.8
Central Canada					
Agriculture	51.5	42.5	40.7	41.4	52.8
Manufacturing	81.4	81.1	81.6	81.2	82.1
All Industries	64.1	61.3	61.3	62.0	68.5
Rest of Canada					
Agriculture	11.2	9.5	8.3	10.7	11.5
Manufacturing	11.2	11.2	10.8	10.9	10.6
All Industries	15.2	15.0	13.5	14.0	14.7

Source: (53, pp. 46 & 49).

TABLE II
INDUSTRIAL OUTPUT, PRAIRIE REGION, 1920 TO 1929
 (Percentage of Total Canadian Net Production
 of Certain Industries in Selected Provinces)

	<u>1920</u>	<u>1926</u>	<u>1927</u>	<u>1928</u>	<u>1929</u>
Manitoba					
Agriculture	8.3	9.0	6.9	7.1	6.6
Manufacturing	4.0	3.8	3.8	3.9	3.3
All Industries	5.7	5.7	5.1	5.7	4.7
Saskatchewan					
Agriculture	16.4	23.0	24.3	24.3	16.7
Manufacturing	1.4	1.7	1.7	1.7	1.8
All Industries	7.8	9.8	10.4	10.0	6.1
Alberta					
Agriculture	12.6	16.0	19.8	16.5	12.4
Manufacturing	2.0	2.2	2.1	2.3	2.2
All Industries	7.2	8.2	9.7	8.3	6.0

Source: (53, pp. 46 & 49).

unifying force of the country's expansion" (53, p. 23). Through its exports the prairies provided a market for the products manufactured in other regions, particularly Central Canada, and provided a source of investment for surplus funds from other regions thereby giving a marked interdependence to the regions of Canada.⁹

The rapid growth of the prairie economy, dependent as it was on a one crop staple, was not an unmixed blessing. It can be seen in Table I and II that although the total proportion of Canadian agricultural production accounted for by the Prairie Region was approximately the same at the beginning and end of the 1920's, it increased and declined substantially during the course of the decade. This was primarily a result of fluctuation in the world demand and price for wheat. The real dangers of relying on a one crop economy were revealed during the depression of the 1930's when a sudden and substantial decline in effective world demand for wheat was compounded by a long and protracted drought. By the mid 1920's the price of wheat was half of its level between 1917-1920. It recovered in 1925 and remained high until 1929 when a serious decline began. As a result of the depression and a subsequent drought in the prairies, the net income of farmers in Saskatchewan, the province most dependent on wheat, dropped from \$218 million in 1928 to \$42 million in 1933 and \$18 million in 1937, or 8% of the 1928 value (30, p. 493). At the same time the price received for Saskatchewan cattle fell from an average of \$53.00 per head in 1928 to \$18.00 in 1934 (6, p. 72).

During World War II, as a result of government programs and incentives there was a marked shift in agricultural production of the prairies away from wheat to coarse grains and livestock, particularly hogs.

⁹ It is noted that Ontario and Quebec have developed their own export staples which has tended to destroy the unifying influence of wheat. This is discussed in Chapter I.

This has led some writers on the subject to believe that as a process of adjustment to these wartime conditions, the dependence of the economy on the staple wheat has been permanently reduced, although they admit that its proportionate contribution to the national income is still a matter of concern (30, p.p. 204-205). Others have even minimized this concern as government policies are now directed to marketing wheat through international organizations with stability as the prime objective.

However, this reliance on wheat is still a matter of real concern to the region specializing in its production and government policies minimizing the instabilities of wheat revenues are not the same thing as reducing the prairie's dependence on wheat. It can be seen from Table III that, with the exception of Alberta, the dependence of prairie agriculture on wheat during the period 1960-62 had changed little from the average in 1924-28. Further, since 1960 the acreage sown to wheat on the prairies has increased steadily in all three provinces, from a total of 23.9 million acres in 1960 to 26.7 million acres in 1962.

TABLE III

PERCENTAGE OF GROSS AGRICULTURAL REVENUE
DERIVED FROM WHEAT IN THE PRAIRIE REGION

<u>Period</u>	<u>Manitoba</u>	<u>Saskatchewan</u>	<u>Alberta</u>
1924-28 (average)	33	64	48
1960-62 (average)	33	58	30

Source: (14)

Consequences of Future Prairie Dependence on Agriculture

The foregoing analysis gives some indication of the probable future consequences to the Prairie Region of the continued dependence of its agricultural sector on grain and particularly wheat. Caves and Holton in their study of the Canadian economy have based their forecast of economic activity in the prairies largely on a projection of past trends and so a continuation of the predominance of wheat in prairie agriculture. On this basis they have concluded that in spite of increased manufacturing activity, parts of the prairies, like the Atlantic Region in the future may develop the appearance of depressed areas:

The Prairie Region as a whole is likely to suffer spells of agricultural depression periodically because the prospects are not bright for world grain prices or for the volumes of grain which other countries will allow to be imported. In all of the prairie provinces manufacturing and resource development have made such strides in the last fifteen years that the area is gradually escaping the perils of the "one crop economy". But agricultural depression would definitely have secondary effects on other economic activity on the prairies. Manitoba and Saskatchewan will probably prove more vulnerable in this respect than Alberta, despite the fact that Manitoba will benefit some from the Seaway (19, p. 645).

Caves and Holton anticipate that total Canadian agricultural output will increase by about one third between 1955 and 1970, but that the labour force required to produce this output will decrease by 177 thousand or slightly over 20 per cent as shown in Table IV.

TABLE IV
REGIONAL DISTRIBUTION OF CANADA'S AGRICULTURAL
OUTPUT AND AGRICULTURAL LABOUR FORCE, 1955 TO 1970

	<u>1955</u>	<u>1970</u>
Agricultural Output	(Millions 1955 Dollars)	
Atlantic Region	157	175
Central Canada	1,392	1,804
Prairie Region	1,109	1,434
Pacific Region	122	170
	<hr/>	<hr/>
Total	2,780	3,683
	<hr/>	<hr/>
Agricultural Labour Force	(Thousands of Persons)	
Atlantic Region	47	27
Central Canada	436	361
Prairie Region	368	290
Pacific Region	30	30
	<hr/>	<hr/>
Total	885	708
	<hr/>	<hr/>

Source: 1955 data (9), 1970 estimate (19).

All told it is considered that this forecast in agricultural output will increase the requirements for agricultural land by some 1,400,000 acres by 1970. This is relatively insignificant when it is considered that about 6,000,000 acres of potential agricultural land are available in Canada. In effect the most economic means of securing the anticipated increased output in Canadian agriculture is mainly the more intensive use of existing agricultural lands, even though extensive expansion would not be difficult. The prospects for the more intensive use of prairie agricultural land appear to be particularly good. On the

basis of then known technology, the Paley Commission in the United States made the following predictions about the possibility of increasing yields per acre in the midwest; wheat 50%, oats 70%, barley 40%, hay 70%, pasture 70% and rangeland 35% (61, p.p. 66-68). These increases are directly comparable to those that could be attained in Western Canada by the greater use of fertilizer and irrigation (28, p. 265).

As was noted earlier, the labour required in agriculture is declining and will continue to decline in the future. In the decade between 1941-51 it declined by 31% and in the decade 1951-61 by 27%. Furthermore, the proportion of the total labour force engaged in agriculture declined from 18.4% in 1951 to 10.6% in 1961. A technique of forecasting agricultural labour force requirements is to apply the experience in the United States to Canada allowing for the greater increase in output expected in Canada. Using this technique, meeting the anticipated 38% increase in output between 1955 and 1970 will result in a 15% decrease in the number of farms and a 20% decline in the farm labour force (28, p.p.49-57).

This reduction in the agricultural labour force of the prairies is going to occur during a time when the population of the region is increasing, albeit probably not at a rate as fast as in all Canada, but nevertheless at a significant rate.¹⁰ This means that if they are to stay in the Prairie Region, a larger portion of the labour force must find gainful employment in the future in fields other than agriculture during a period when the overall economy of the region is liable to be subject to sharp fluctuations in agricultural income. This is not to say that the conditions

¹⁰ For example the anticipated change on the population of Canada and the Prairie Region between 1954 and 1970 is as follows:

	<u>Prairie Region</u>	<u>Canada</u>
1954 (thousands)	2,745	15,195
(per cent)	18.07	100.00
1970 (thousands)	3,129	20,984
(per cent)	14.90	100.00

of the depression of the 1930's will repeat themselves but severe fluctuations could develop. As W. A. Mackenzie stated: "While it is not necessary to assume a recurrence of the purely fortuitous coincidence of agricultural and industrial crisis and prairie drought, it is entirely probable that Canada will experience in the future sharp variations in the proceeds of exports. Under stable world conditions these will be less than under unstable conditions, but under any conditions the Canadian economy will be liable to relatively great fluctuations" (55, p. 101). These will probably occur even though a primary objective of the government is the maintenance of a high and stable level of employment and income.¹¹ Unfortunately, Canada can apply monetary and fiscal measures less successfully than for example the United States to avoid extended periods of low income and employment. Being an open economy this country is highly sensitive to the export market. If the United States and Great Britain, our largest customers, fail to maintain high employment levels, employment in Canada is put under particularly great pressure (19, p.9).

The potential effects of this vulnerability of Canadian exports is particularly severe in the prairies because of the degree of dependence of that region on agricultural exports. This is reflected in some degree in Table V which shows the effect of a loss of exports on selected Canadian industries.

¹¹ As stated in a white paper on the post-war Canadian economy issued by the Government of Canada in April, 1945.

TABLE V
EFFECTS OF A DECREASE IN EXPORTS
ON SELECTED CANADIAN INDUSTRIES

Sector of Economy	Fall Output if all Exports Stopped (\$Millions)	Col. 1 as a % of Total Output of each Sector	Ratio of Col.2 to Weighted Average
	(1)	(2)	(3)
Agriculture	952.1	30.7	3.0
Forestry	289.9	64.4	6.4
Food & Beverage	529.9	13.4	1.3
Forest Products	1112.0	55.4	5.4
Construction	112.7	4.0	0.4
Transport & Trade	1044.1	23.2	2.3
Services	377.5	10.6	1.0

Source: (19, p. 126) Calculated from data in (11).

Column 3 shows the real vulnerability of not only agriculture, but all primary industries to changes in the level of exports.¹² For example, it will be noted that agriculture is 2.3 times as vulnerable as the food and beverage industry. The relative stability of the food and beverage industry to fluctuations in the level of exports points up one possible means by which the prairie economy can be developed in the future, to relieve some of its dependence on the export staple wheat and to build in a greater amount of stability. This can be accomplished in part by increasing the manufacturing and processing of its staple products not only for local use but for export outside the region to Central Canada.

Role of Export Oriented Industries in Prairie Development

The Prairie Region has maintained a fairly constant share of Canada's manufacturing output since the decade of the 1920's. However,

¹² The ratios of those primary industries omitted are:
fishing - 4.2; mining and quarrying - 7.9; mineral products - 2.0.

in general the manufacturing complex in the region has remained one geared to supplying the needs of the local market, and has grown primarily as the demand of the region for imported goods increased to the point where replacement by local manufacture or fabrication was feasible. There are of course exceptions. In Manitoba, pulp and paper production early appeared among the top ten industries measured by gross value of production and it is obviously an export oriented industry. Also, slaughterers and meat packers, flour mills, and butter producers in Manitoba have for a number of years exported a good part of their output. Finally, there is the more recent and dramatic example of the oil and gas industry in Alberta which exports nearly all of its output from the region either unprocessed or fabricated into a variety of plastic and chemical products.

The main question that is of concern here, is how far the shift in manufacturing will go; to what extent will manufacturing activity in Canada shift proportionately away from its centre of gravity in Central Canada to other regions and more specifically to the prairies. Caves and Holton in their study of the Canadian economy have also speculated about this and have concluded that during the next decade at least, the prairies will only maintain their current share of total manufacturing activity, about 8% and will only provide employment for about the current proportion of manufacturing employment, slightly less than 7%.¹³ Even if one accepts

¹³ (19, pp. 612-613) Their estimate of the Prairie Regional share of Canadian manufacturing (gross value of output in 1955 dollars) and labour force in 1970 compared with 1954 is as follows:

	<u>Output</u>	<u>Labour Force</u>
1954	1,364,000,000 (8.1%)	86,600 (6.9%)
1970	2,627,000,000 (8.0%)	125,200 (6.8%)

Caves and Holton's overall projection of the outlook for prairie manufacturing, the effect of the forecast level of manufacturing on the growth and development of the prairie economy can and will vary substantially depending upon the types of industries which expand and whether they are "locally market oriented", i.e. only serves the needs of the local regional market, or "unfettered industries", i.e. produce goods and materials that are exported to other regions of Canada or to foreign markets.¹⁴

Michael Daly was one of the first writers to find, in a study which he did of British industry during the period 1921-31, a relationship in an area between an increase in employment in "unfettered industries" and an induced increase in employment in other local market oriented industries. As he put it, if 120,000 men are put to work in the unfettered industries of an area, probably not less than 162,000 new jobs in localized (market oriented) industries of the region will be created (25, p. 254). The phenomenon of the export oriented industry inducing additional activity in local market oriented industries has since become known as the multiplier effect. It is normally measured in terms of employment and is usually defined as the number of jobs created in the region as a whole per job in the sector in which employment originally increased. Defined in this way Daly's multiplier for his unfettered industries was 2.042 (one job in unfettered industry resulted in 1.042 jobs in localized industries). Other studies of other regions and industries carried out since have shown that the multiplier can vary substantially depending upon the particular industry and the

¹⁴ An example of a relatively "unfettered" industry in the Prairie Region is food and beverage which produces about 16% of the total output of that industry in Canada. Local consumption is only about one third of the output, the remainder is exported to other regions.

particular regional economy. A study of the Los Angeles area revealed a multiplier of 2.248 (one job in unfettered industry resulted in 1.248 jobs in localized industry) (38, pp. 241-249). Later a study of the Utah economy revealed a series of multipliers ranging from a low of 1.75 in trades, services and utilities to a high of 5.40 for non-ferrous metals (57, pp. 368-383). Finally, a study of the impact of a new steel mill in the Greater New York-Philadelphia Industrial Region revealed a multiplier as high as 7.70 (45, pp. 289-301).

The implications of this multiplier effect on the growth of industry in the Prairie Region are twofold. In the first instance it suggests that the development of export oriented industries is the key to overall economic expansion of the region. In the second instance it suggests that certain export oriented industries will have a greater "stimulating effect" than others. Both of these propositions can be illustrated to some degree by examining the effects of the oil and gas development on the prairie economy and later comparing it to the effect of agriculture.

During the early years of its development, the claims of the potential effect of the oil and gas boom were far reaching and sweeping; such as predicting that it would cause important structural changes in the economy of the Prairie Region. This in part was a result of the fact that industrial employment in Alberta doubled between 1946 and 1953 as did total personal income. It was noted that during this period there was a great upsurge in agricultural activity. However, the increase in agriculture affected all the prairie provinces whereas the rate of expansion was much faster in Alberta than Manitoba and Saskatchewan. To a considerable degree

the growth of the Alberta economy during this period was the effect of the large capital expenditures on the exploration and development of oil and gas (\$330 million in 1954 and \$350 million in 1955). In part it was due to the establishment of industries derivative to gas and oil, important petrochemical plants manufacturing sulphur, ammonia, cellulose acetate and plastics (20, p. 552).

Subsequent studies have been made of the employment multiplier of oil and gas on the Alberta economy.¹⁵ These studies indicate that for every 100 persons in the work force engaged in basic oil and gas production, there will be 42 extra employed in service industries, 33 extra employed in petroleum products industries, and a 9% increase in the work force manufacturing products for the local market. This yields a multiplier of 2.71; i.e. every 100 jobs in oil and gas extraction generate 171 jobs in other sectors of the economy.¹⁶ Investigations carried out in Texas where the oil and gas industry is much older than in Alberta but is in approximately the same economic environment as in Alberta indicate that the employment multiplier discussed above is reasonable and cannot be expected to change much over time. For example, in Alberta in 1951 there were 4 workers producing and prospecting for crude oil and gas for every one worker engaged in petroleum refining and products. In Texas in 1954 the ratio was 3.4:1; and

¹⁵ The example used here was prepared by Caves and Holton (19, pp. 210 and following).

¹⁶ In this example, if x = the increased employment in industries other than gas and oil per person employed in that industry then:

$$x = 0.33 + 0.42(x + 1) + 0.09(x + 1) = 1.71.$$

if employment in the entire Texan chemical industry is included, the ratio becomes 1.8:1, very close to that in Alberta (19, p. 207).

Studies undertaken of the employment multiplier in the Alberta agriculture industry indicate that it is only about 1.4 (i.e. ten persons employed in agriculture result in the employment of four in other local industries). This is just about half the multiplier effect of oil and gas and largely reflects both the fact that there is little processing of agricultural products within the province before they are exported, and that most of the needs of agriculture are imported rather than locally manufactured. For example, in 1951 it appeared that there were only about 7 persons employed in the entire local food and beverage industry per 100 workers in agriculture, compared with a rough long term ratio of 33 persons employed in petroleum products and refining per 100 workers in oil and gas exploration and extraction (19, p.212).

The experience of Alberta's economy under the impact of oil and gas indicates that the amount of manufacturing processing and other economic activity which the exploitation of a staple generates locally can and does vary substantially depending on the nature of the staple and the local economic conditions. We now turn to an examination of other earlier and perhaps more important staple exploitation to see how it has affected the regional growth of Canada and particularly the Prairie Region and Central Canada.

CHAPTER I

STAPLE EXPLOITATION AND REGIONAL GROWTHThe Staple Theory as an Explanation of Regional Development

It is well known that to a considerable degree the history of Canada's economic growth is a history of the successive exploitation of a number of the country's natural resources. First there were the fisheries off the eastern coast and then the fur bearing animals of the forest. Later permanent settlement brought the agricultural lands and forests of the St. Lawrence valley into use. As the nineteenth century closed a wheat economy sprang up in the prairies. Later in the twentieth century the forests contributed pulpwood as well as saw logs. Hydroelectric power was developed to assist all industrial processes. More recently, vast mineral discoveries gave rise to a new boom as the accidental discovery of mineral wealth while building railways gave way to systematic exploration (23).

As was noted earlier, Canadian scholars developed a comprehensive explanation for these waves of natural resource exploitation and their effects on the staple theory of Canadian economic growth. This theory emphasizes the role of world demand for resource based Canadian products, the discovery of these resources and the technology used to exploit them. It also stresses the rapidity with which resource development and general economic growth proceeded because the resultant export booms have attracted capital and population to Canada. The coincidence of capital and population inflow were particularly important. Foreign capital moved in to supplement domestic saving at the same time that immigration has expanded the labour force thereby providing a growing domestic market and pushing back the frontier of settlement.

Basically, a staple can be considered as any product with a large natural resource content. Some part of its fabrication must take place at its source, even if only in the sense of seizing it away from nature. The staple is a product which does not require elaborate processing involving large quantities of labour and rare skills. (This of course does not preclude it from using large amounts of capital, as indeed most of Canada's staples have.) The staple is a product which will bear transport charges and which is in international demand. Finally, all of Canada's successful staples have thrived on vigorous export markets (19, p. 31).

The relationship between staple production and other facets of Canadian economic development was recognized early by scholars. H. A. Innis in his essay "Unused Capacity as a Factor in Canadian Economic History" traced the important relationship between Canadian settlement and staple production in earlier years. The key, he pointed out, was unused capacity and specifically the search for balanced cargoes for trans-Atlantic shipping. In the case of the fur trade there were light compact eastbound cargoes compared to heavy bulky westbound cargoes of supporting equipment and supplies. Consequently, there was no room for settlers and their effects on the westward trips. Exactly the opposite was true of the later timber trade. In the case of this staple the bulky cargoes were eastbound and there was plenty of excess capacity on the return westbound trip to accommodate settlers and their effects (42, pp. 1-15).

Since these early days, subsequent staple exploitation or resource development has supported growth in other segments of the economy and so generated a filling in process which manifests itself essentially in three ways in order of historical importance.

1. A larger population with a steadily increasing income supported a growth in consumer goods industries which tended to be a more steady form of economic activity than staple production.
2. In almost all lines of resource based production for export, the tendency has been for an increased amount of processing to be done in Canada before export.
3. The high level of savings and capital formation in Canada has given sporadic stimulus to the production of investment goods at home. This latter development has not been as systematic as the first two but does reflect Canada's continued success at profiting from an international division of labour (19, pp. 22-23).

Another fact which is significant in the succeeding waves of staple development which have swept over the Canadian economy is that they have in part occurred or been triggered by broad changes in world technology and the demand for raw materials. For example, the rising timber exports in the late eighteenth and early nineteenth centuries were largely in response to Britain's fear over a loss of Continental European supplies during the Napoleonic Wars. In the case of wheat and the settlement of the Canadian west, major stimuli were the development of rust resistant early maturing strains of wheat, a rise in world wheat prices in the mid 1890's, and the closing of the American frontier. In the case of pulp and paper, contributing factors were the coincident dramatic growth of daily newspapers in the United States and the discovery of the sulfite pulp process. In the case of mining development it was not so much a case of discovery of mineral deposits as the perfection of mining machinery and new extraction techniques in the United States at the beginning of the present century.

Largely as a result of these changing technological factors and the general growth of the Canadian economy, recent staple development has

been influencing the growth of the Canadian economy in a different manner than older staples did. For example, the problem of securing the inputs required for present staple development is not as critical as more factor supplies are available in Canada from the more diversified national economy. Furthermore, recent staple developments tend to be more highly capital intensive, have a much smaller labour requirement per unit of output and consequently there is relatively little significant settlement required in the immediate area of staple extraction. These changes have meant that different types of industries are now being encouraged or stimulated by the growth in staple output. Earlier, as in the case of wheat, secondary expansion occurred mostly in industries supplying the needs of staple producers. More recently, as in the case of oil and natural gas, the most important impact seems to be in those industries which are themselves supplied by the staple output (19, p. 44).

In addition to influencing the overall growth of the Canadian economy in a different manner, the newer staple development is tending to foster a greater degree of "regionalism" in the Canadian economy. It is tending to foster a north-south trade with the United States thus breaking up the forces for national unity of the earlier staples, particularly wheat. The tendency of staple production to be localized and so to be regionally oriented was recognized in the work of Harold Innis. However, the original staple wheat, which was the foundation of the Canadian economy, tended to orient the country in an east-west direction. In the dominant period of this staple the Prairie Region was dependent on European markets and Central Canada on prairie purchasing power. In this manner the differences between

these two regions were minimized and in effect the entire area became one economic region. Now the effect of the rising forest and mineral staple growth has been to change the relevant demand for capital and consumer goods to within Central Canada itself whereas the relevant foreign markets are in the United States (5, p. 46). Once again, therefore, the old tendency of the Canadian economy to a north-south trading pattern has appeared; a tendency which currently is being extended to the Prairie Region through the discovery and production of oil and gas.¹

From the foregoing it can be seen that, as a few recent writers have emphasized, the staple theory is more than any thing else a theory of capital formation, industrial location and regional economic growth. As such it still plays a crucial part in any interpretation of the Canadian economy or portions thereof (19, p. 30). A further advantage of the theory is that it can be used to explain both the growth of the nation and the regions of which it is comprised.

The Political Background and National Policy

It has been stated that as a nation, Canada is a geographic oddity, a thin line of settlement lying along the northern boundaries of the United States and that the problems of developing a national economic

1. Some writers such as Easterbrook and Aitken disagree with the above view of oil and gas and instead liken it to railway transport after confederation as an instrument promoting national unity. To support this they note the policy of the federal government prohibiting the export of gas and oil until Canadian needs have been met and the existence of the east-west pipeline. While this approach is valid to a point and has obvious parallels with certain aspects of railway development there are several critical differences. The natural market for Canadian oil and gas is to the south of Alberta in the United States and it is being increasingly exploited. Also, the movement of oil and gas to Central Canada via pipeline is not likely to induce the secondary east-west economic interdependence that railways and wheat did.

entity from this land mass has been one of our chronic problems since Confederation. The argument goes on that as a result of this, Canadians at all subsequent times have been in tacit agreement that they must maintain a "constructive nationalism and a common striving to achieve national economic integration" (19, p. 44). If this is the case, what were the forces shaping the economic foundations of the country? What were the economic concepts of Canadians at the time of Confederation and what did they do to implement these concepts?

In 1867, as at present, the St. Lawrence lowlands were the economic heart of Canada. The possibility of working out from this central area to the far west on the basis of a single resource in demand in external markets had already been demonstrated by the fur trade, and in wheat the physical environment was once more to provide a strategic staple for this purpose. An east-west alignment linking Canada with Europe via the shortest of Atlantic crossings had already appeared as a response to geographic conditions, and during the nineteenth century the natural lines of development showed no deviation from this pattern (30, p. 384). The political attitudes fostering the development of the Canadian nation in an economic sense therefore had roots which extended back well before Confederation. Admittedly, the loss of British preference for a time tended to reinforce the initial natural tendency to a north-south orientation.² However, the end of the Reciprocity Treaty marked the last serious movement in that direction.

The basic economic concept of Canada at Confederation tended to be of a transcontinental east-west national economy. The economic model to which Canadians looked was the United States. In that country the great

² See Introduction, pp. 4-9.

internal expansion was facilitated by the construction of canals and railways with the rapidly growing Atlantic centres "feeding on the huge hinterland." This is what Central Canada wanted, but the internal market was too small and consequently the possibility of specialization and integration limited. Two possibilities existed, a renewal of reciprocity with the United States and this integration with that economy or developing a new Canadian frontier through western expansion (53, p. 14). The latter course was taken.

This decision to pursue national development through western expansion was arrived at between 1857-1869. The main element consisted of the Canadian acquisition of the British territory of the great central plain (Rupert's Land and the Northwest Territory) as a region of frontier settlement capable of rapid development and capable in turn of stimulating development in other parts of Canada. However, this acquisition alone was not sufficient to ensure the type of development wanted and it was supplemented by two other key policy decisions which were put into effect in the decades after Confederation. The first of these was the development of all Canadian transportation routes (not just trans-continental railway) which meant higher transportation costs and required extensive participation by government. The second decision which was reached later in 1879 and only after much hesitation, was to encourage industrialization through protective tariffs (53, pp. 15-18). However, the acquisition of the Prairie Region was the key to national development, and its importance is summed up by

Chester Martin:

In truth the transfer of 1870 (of the Prairie Region) marked a revolution ... in the very nature of the Canadian federation. It transformed the original Dominion from a federation of equal provinces, each ... vested with

its own lands, into a veritable empire in its own right with a domain of public lands five times the area of the original Dominion under direct federal administration (53, p. 17).

As noted above, the institution of protective tariffs was the last element of the development policy to be instituted. It was the one aspect which was not considered prior to Confederation. Although it certainly had its proponents at that time, it was largely caused by subsequent fortuitous events. Prior to 1879, raw materials and most semi-finished goods were admitted free, imports of manufactured goods faced a 15% ad valorem tariff which was raised to 17.5% in 1874 and there were generally higher rates on luxury goods. In effect it was a revenue tariff. The period from 1874 to 1878 was one of recession and disruption of world trade which resulted in a real fear of national bankruptcy in Canada. It was primarily this which resulted in the raising of protective tariffs in 1879, the last step in the creation of the so-called "National Policy". Under the new tariff, the rates on items not otherwise specified were raised from 17-1/2% to 20%. The textiles and steel industries were given special protection as the rates on semi-finished goods and industrial materials were raised from 10% to 20%, on fully manufactured goods to about 25%, and on finished consumer goods to 30%. In addition a specific duty of 50 cents per ton was levied on imported coal in order to improve the position of the Nova Scotia coal industry. This trend to higher protection of domestic industries continued to 1887 and on an irregular basis well into the twentieth century (30, pp. 392-394).

The foregoing is a description of the elements that constituted the "National Policy" which served as the keystone of Canadian growth for fifty years to about 1930. Its basic features were railways, steamships,

tariffs, industrial development and the wheat of the prairies. By 1890 these formed the essential characteristics of a Canadian policy which had been evolving since about the middle of the nineteenth century. The key to this entire policy was the west:

Agricultural development of the west was basic to the whole programme, and wheat was to become the new staple to which the transcontinental economy was geared, the means of attracting capital and immigrants and of creating a mass market for the materials and manufactured products of the other regions of the Dominion. (This was) a programme of national planning in which private enterprise, strongly backed by the state, was to create the strong though vulnerable structure of the twentieth century Canadian economy (30, p. 383).

This policy was effective, and the national economy developed as was hoped, particularly the economy of Central Canada. As Mackintosh pointed out, it was a technique by which the new markets in the west were made available to other parts of Canada and fostered manufacturing in Ontario and Quebec on a greater scale than hereto. Naturally sheltered local industries declined and were replaced by larger-scale industry protected against growing competition from the United States. Later, pressure to reduce tariffs resulted in the institution of the British Preferential system which continued to protect the east-west flow of goods in Canada against United States competition and in some ways increased the protection afforded local industries (53, pp. 19-21). O. J. Firestone, while conceding the above, argues that in the 1880's and 1890's the new rail network and cheaper ocean transport which made Canadian raw materials more competitive in Europe, were much more of a stimulus to the development of manufacturing (33).

Undoubtedly, the development of the staple wheat in the prairies and the industrial growth of Central Canada were influenced by government

policy, the cheapening of transportation costs as well as many other technological and market factors. We shall examine some of these factors more closely, particularly to determine the effect they had on the type of economy which did develop in the Prairie Region and its relations with and effect on the economy of Central Canada.

Wheat -- The First Major Staple and its Effects

The world was by no means anxiously awaiting the wheat of the prairie provinces. The transcontinental railway was completed in 1885 but the west did not really start its major period of growth until about 1900. Why was there a fifteen year delay? A variety of adverse factors were responsible. There was the problem of adapting existing agricultural techniques to a new area. The production of wheat was difficult in a new geographic and climatic area. There were also relatively high internal freight rates and external ocean rates with which to contend. Perhaps the prime reason, however, was the competition resulting from the final filling up of the middle west in the United States. It was only when the best lands in the United States had been alienated, and that countries agricultural surplus reduced by her growing domestic market that Canada's national policy began to pay long awaited dividends (30, p. 396).

By 1900 the American middle west had filled up, and the other factors inhibiting development had been largely overcome. As a result, the Canadian prairies began their great decade of development. In the two decades between 1893-1913 Canada's grain exports grew four times (66, pp. 40-45), wheat production increased by 300% between 1900 and 1910, and the population of the region tripled.

This was only accomplished by the relatively coincidental solution to a number of problems and some basic changes in world demand for grain. In the first instance, the existing grains had to be adapted to prairie conditions, such as the complex physical environment and especially the short growing season. The Prairie Region is really comprised of three broad climatic and soil zones each with their own characteristics which had to be recognized before a satisfactory agricultural pattern could be developed. The northern band is characterized by a sub-humid climate and dark soil. It is best suited to mixed farming and dairying and it is dangerous to concentrate on wheat because of the short growing season and relatively poor quality. The southwest portion is characterized by light brown soils and extreme variations in rainfall. It is more suited to cattle and sheep rather than wheat. The final middle or southern band is characterized by chestnut or dark brown plains soils of semi-arid type. It is excellent for wheat growing, yields the largest crop per acre and it is here that the bulk of Canada's best wheat is currently grown. . . . Nowhere in the prairies did the existing wheats imported from the central United States and Ontario perform well. But a great improvement was made with the introduction of a new strain, Red Fyfe, in 1900. Further improvements were made in 1911 when Marquis was introduced which matured in a shorter time and provided higher yields, and again in 1920 when the new strains Garnet and Reward allowed production of wheat further north (30, pp. 478-479).

The adoption of new farming technology, particularly that developed in the plains area of the United States, was also an important factor. If summer fallow and dry farming techniques had been used

extensively earlier it seems probable that yields would have been sufficiently sizeable and quality sufficiently good to compensate for the higher transportation rates which prevailed in the 1890's (21, pp. 15-99). Even though the chilled steel plough and the roller method of milling were known prior to this, the new cultivation techniques were necessary for massive wheat development.

Other factors which contributed to the wheat boom were a rise in world wheat prices and a decline in shipping costs. As a result of the world-wide depression mentioned earlier,³ world wheat prices fell in the 1870's and by 1893 stood at 64-1/4¢ per bushel, reportedly the lowest price since the fourteenth century (52, p. 240). After 1893 and the return of prosperity in Europe wheat prices started to rise and with few exceptions continued to rise during the entire first decade of the twentieth century. The total wheat acreage in the prairies reacted sensitively to these wheat price changes. Except for one year, it grew sharply following each year of rising prices in this period and marked time following the years of falling prices (7, pp. 19-21). The big break in rail transportation costs came in 1897 with the implementation of the Crows Nest Pass freight agreement, in effect a subsidy of \$11,000 per mile or equal to about a 20% freight reduction on wheat, and the subsequent reduction of rates on the inward movement of settlers effects (23, p. 179). At the same time ocean shipping rates on wheat were reduced and the adoption of new grain handling techniques further reduced costs. It was the combined effect of all of the above described factors which not only made the raising of wheat in western Canada economically feasible but provided the extra incentive required for initial settlement.

³ See this chapter pp. 31-35.

During the period of the initial settlement of the west, agriculture in Central Canada underwent a transformation away from grain, in effect becoming non-competitive with prairie agriculture. Part of the reason was the pressure of direct competition from western grain in the face of difficulties of disease and winter kill in raising grain in Central Canada. More important, however, was the rise in the opportunity cost of producing crops other than grain. The growing urban centres in Ontario and Quebec generated a demand for dairy products and garden truck. Improvements in trans-Atlantic steamship handling of livestock made shipping cattle to Britain a little more feasible encouraging the accelerated breeding of livestock (44, pp. 554-555). A major export market for cheese also developed. In this way prairie agriculture was left entirely unchallenged in the area of grains, particularly wheat.

The end of what has been termed the "wheat phase" of Canada's national policy really occurred in 1930 with the transfer of the ownership and control of natural resources to the Prairie Provinces. It was an era of remarkable achievement during which wheat was the dominant force in the national economy. The extent of the accomplishment during approximately the three decades ending in 1930 can be measured by the fact that by that year more than 88% of the surveyed land area of the Prairie Provinces had been disposed of "for the purposes of the Dominion". The population of the Prairie Region which was 420,000 in 1901, by 1931 had increased five fold to 2,350,000 (Manitoba from 255,211 to 700,139, Saskatchewan 91,379 to 921,795 and Alberta from 73,022 to 731,605). In 1901 the region contained 10% of the total Canadian population, but in 1931 it contained about 25%.

During the same period, the occupied land area in the region had increased seven times from 15.5 million acres to 110 million and the improved acreage had increased eleven times from 5.6 million acres to 60 million acres. The importance of wheat can be seen from the fact that in 1901 it occupied 4.3 million acres which increased to 26.4 million acres in 1931. Exports of wheat rose from a value of \$7 million in 1901 to \$311 million in 1921, or from 4% to more than 25% of all exports (30, pp. 481-482).

To a considerable degree, the development of the prairie economy based on the staple wheat can be viewed as an extension into new fields of operation of the Central Canadian economy. In many respects it merely entailed a transfer of economic and political institutions, and of financial, marketing and transport systems, from eastern to western Canada. The prairies were a new hinterland to be developed in the national interest, a frontier to be controlled along lines laid down well before expansion began. The prairies fully lived up to expectations in that they were a major source of the industrialization of Central Canada and finally caused the national policy to "pay off" in the formation of a large industrialized sector. The growth of this industrial sector is shown by the fact that the net value of production which was only \$214,500,000 in 1901 was \$564,500,000 in 1911; an increase of 163% in one decade or a compound annual rate of 11.1%. Furthermore, despite the increase in the size of the labour flow into the prairies during the period, the portion of the population engaged in manufacturing remained constant (19, p. 44). However, the increase in industrial output was not confined only to those sectors making goods for the prairies (the output of agricultural implements doubled and that of railway rolling stock increased four fold); as the output of nearly all

major classes of manufacturing doubled in response to the increased demand for a host of consumer and industrial goods (16, pp. 66-74).

To some extent, industry in the other regions of Canada benefited from the demands of the growing market in the west such as the lumber mills of British Columbia and the steel mills of Nova Scotia. The prime stimulus however, occurred in the heavy concentration of manufacturing in Ontario and Quebec which established these provinces as the industrial heart of the nation. This concentration of industry and economic power in turn gave rise to regional frictions and discontent which still exists. However, it must be regarded as the logical consequence of "National Policy" decisions in that the east-west economic and political alignment of the country, and the linking together of its various regions was greatly strengthened by both the diffusion of western farmers' buying power throughout the economy and the growth of industry in the Central Region (30, p. 485).

In summary, the period of Canada's development when the staple wheat was king can be termed the "European phase" of national development when the growth of the Canadian economy was geared to the expanding industrialism of Europe. In general, the design presented few deviations from the pattern which emerged in the fur trade and lumber trade (30, p.406). The scale was larger and more complex but the principles were essentially an extension of the old commercialism and canal days with these two factors being replaced by industrialism and railways. Unfortunately, this development which made Canada a more effective world trader also increased the vulnerability of the domestic economy to external changes and to the effects of unpredictable shifts in the commercial policy of those with whom she traded.



The close of the wheat phase of Canada's economic development in 1930 marks the beginning of a less spectacular and expansive period in Canada's agricultural history. The series of bad crop years which coincided with the depression brought home the dangers of overspecialization (30, p. 482). The policies pursued in the second World War were taken as evidence that the lessons of the 1930's had been well learned. At the outbreak of war in 1939, in response to a rapid increase in price and improved possibilities for export sales, a sudden expansion in wheat production occurred (the acreage sown to wheat increased by two million acres in 1940). However, because of the blockading of the British ports and the loss of the Europe market, in 1941 the Canadian Wheat Board restricted deliveries to 230 million bushels annually and each farmer was assigned quotas of 65% of his 1940 average. In addition, subsidies were paid to farmers to encourage increased dairy and livestock production and compensation was paid for land taken out of wheat and used for summer fallow or the production of coarse grains.

Under the stimulus and control described above, prosperity returned to prairie agriculture but wheat no longer set the pace. In 1939 some two thirds of prairie farm cash income came from wheat, by 1942 this share had declined to about one third and in Alberta in 1942 and 1943 the cash income from hogs exceeded that from wheat. However, these controls were not enduringly effective and even before the end of the war prairie farmers were turning back to wheat (30, pp. 494-495). This return to wheat was largely a result of the natural advantage of wheat in a great portion of the Prairie Region. As Easterbrook and Aitken put it in discussing this and the early post war period; "any pronounced shift

to other lines of agricultural production would result, in anything like normal times, in a loss of economic utilization of prairie resources" (30, p. 496). Conditions did become very "normal" during the post war period and wheat, once more became king. In 1952 and 1953 respectively the two biggest wheat crop years in Canada's history were recorded when 688 million bushels and 618 million bushels were harvested. Exports of wheat were the second highest in history, being exceeded only in 1928-29, and reached a value of \$620 million in 1952, more than 14% of all exports.

Since then there have been doubts about the future export markets for wheat resulting from increased pressure from other exporting nations in foreign wheat markets, a downward trend in wheat prices, and a piling up of surplus wheat stocks in both Canada and the United States. Nevertheless, prairie agriculture continues to be dominated by and rely on this one staple.⁴ In this manner, the Prairie Region has tended to remain to a substantial degree a one crop export staple economy with all the resultant potential instabilities and problems, whereas the rest of Canada and particularly Central Canada to a greater degree has diversified and industrialized.

Changing Emphasis on New Staples -- Pulp and Paper and Mining.

Prior to 1930 and the end of the wheat stage of Canada's economic development there were indications of changes which were to lessen the nation's dependence on this export staple. The most significant of these was the beginning of a slow shift in the centre of the

⁴ For example, the 1963 wheat acreage is about 26.4 million acres, the largest since 1950. If the yield is only average this will mean the production of a crop of more than 500 million bushels. As domestic consumption can take no more than 150 million bushels this will result in an addition of 350 million bushels to the 480 million stock pile already available for export; a quantity more than three times the annual export sales during the past few years. Source: (9, 1960) and McLeans Magazine (July 6, 1963)p.2.

nation's economic gravity back to the Canadian Shield through the growing importance of two new staples -- pulp and paper and minerals. Two factors which had dominated the wheat economy continued to be major factors dominating the development of these new staples and it can be expected will continue to dominate staples currently being exploited, such as oil and gas as well, as those which are yet to come. These two factors are new technological developments which tend to make the exploitation of Canadian resources profitable and the exhaustion or occupation of all free or readily available similar resources in the United States (19, p. 14). In other words, new metals, new techniques of transportation and new means of utilizing the country's energy resources constitute the elements of the technological revolution which is still underway. The exhaustion of the readily available resources in the United States has reacted and is still reacting differently on these newer resources than it did on wheat. In the case of these newer resources it is providing the basis for a large and increasing market within the United States itself; in the case of wheat it merely meant a slackening of competitive pressure on the part of the Americans in the European markets. This in turn has resulted in an orientation of the sectors of the Canadian economy providing these staples to the United States, rather than to Europe.

The exploitation of the two new staples the pulp and paper and minerals of the Canadian Shield, were similar both with respect to the course of their development and their effect on the economy of Central Canada. They were both initially developed by United States capital with the aid of United States technology to serve the United States market.

The Canadian policy with regard to both of them has been to encourage the later stages of production, processing and manufacture to be carried out in Central Canada before export to the United States, rather than allow the export of the raw staple. The story of the development of these staples is the story of the battle for local staple processing and manufacture.

The difficulties of the Canadian policy of encouraging staple processing and manufacture in Canada were many. United States tariffs favoured raw material imports and penalized imports of processed and manufactured materials. The corporate control of the enterprises exploiting the Canadian raw staples was usually in the United States, which gave particular retaliatory powers to domestic American producers who were determined to maintain and control their domestic market. American processors also had the basic locational advantages of being able to situate the intermediate and final stages of processing close to the market and its allied industries. Regardless of such factors, the success or failure in each case depended ultimately on the balance of bargaining power. It was strong in those cases where Canada was the only source of supply economically available to the United States producers reinforced by other locational factors such as low cost energy. In other words, the general Canadian policy of domestic processing proved effective only when it operated to reinforce other locational advantages favourable to Canada (2, p.547).

In a similar manner to wheat, the two staples under consideration here, pulp and paper and mining, were important factors in the industrialization of Central Canada particularly in the latter years of the period

1900 to 1920. Sources of pulp and paper were located in Northern Ontario, Quebec and New Brunswick in areas which required industrial materials and consumption goods but produced none. For example, by its demands the pulp and paper industry contributed to the rise of the electrical equipment industry, the output of which rose from \$1,960,000 in 1900 to \$67,500,000 in 1923. Mining, located principally in Northern Ontario enlarged the domestic market for consumption goods as well as being a large purchaser of machinery, chemicals, explosives and operating supplies (53, p. 29). We now turn to a more detailed examination of the development of both of these staples to determine in what way they were different from wheat and how this difference affected the growth of the Canadian economy and particularly that of Central Canada.

Pulp and Paper

In the decades immediately after the turn of this century the opening up of Western Canada had a serious effect on the old well established lumber industry of the St. Lawrence lowlands. With the completion of the Canadian Pacific Railway, British Columbia seized the prairie lumber market from Eastern Canada. Later the opening of the Panama Canal allowed British Columbia lumber to compete on the eastern coast of North America. It was only the simultaneous growth of the pulp and paper industry in the St. Lawrence region which averted a major problem of readjustment.⁵

During this same period a new and vast market for pulp and paper rose in the United States. In that country per capita newsprint consumption rose from 8 pounds in 1890 to 30 pounds in 1913 and a peak of 62 pounds in

⁵ It is noted that the type of replacement described here of the staple of one region being replaced in a market area by the same staple of another region has not been too common in Canada. However, it may become more prevalent in the future as a result of the changing impact of technology.

1929. This resulted in an increase in total demand from 200,000 tons in 1890 to 3,800,000 tons in 1929 (36, p. 234). Canada and particularly the St. Lawrence region was well equipped to become a major producer of this commodity. The region had ample supplies of pulpwood, excellent water and power sites, good transportation from the forest to potential mill sites and from there to market, all of these located quite close to the major American market concentration.

It was the exhaustion of the domestic supplies of pulpwood within reasonable proximity to markets in the United States and the invention of new pulp and paper making processes that set the specific time for the development of the Canadian newsprint industry (19, p. 36). By 1910, because of the exhaustion of their own supplies, newsprint mills in the United States had to turn to Canadian sources of pulpwood which at that time were expensive because of the high cost of transportation. However, the development of bigger and better newsprint machines conferred a competitive advantage on new pulp and paper mills which gave the incentive necessary to the establishment of a Canadian pulp and paper industry. Restrictions imposed on the export of pulpwood from Canada by the Ontario and Quebec governments between 1900 and 1913 were helpful, and by the latter date both Canadian and United States restrictions on newsprint production and trade had been largely removed and a free North American market had been established in which the Canadian producers of newsprint had a clear economic advantage. This is illustrated by the fact that Canadian pulp production increased from 850,000 tons to 1,850,000 tons between 1913 and 1920 and the largest increase was in sulphite pulp where the new technologies mentioned above particularly assisted Canadian development (15, pp. 145-158).

When the Americans began to reach into Canada for their lumber and pulpwood it was primarily the provincial governments who took action designed to encourage local processing before export as they and not the federal government owned the forest resources.⁶ The form that such Government action took consisted of regulations prohibiting the exportation of raw lumber and pulp logs cut on crown lands.

The objective of such regulations was to compel the migration of manufacturing and processing to Canada thereby securing the benefits of larger payrolls, more valuable exports and greater taxing capacity to the regions and provinces concerned (2, p. 529). The regulations were only practical because, with the exception of Nova Scotia and New Brunswick, the federal and provincial governments owned most of the timber lands,⁷ and granted only cutting rights to the timber and pulp companies. Although there were slight variations from province to province, generally the timber and pulp companies operated on 21-year renewable leases which gave them the right to cut and remove certain sizes and species of trees. For this privilege they had to pay a ground rent on the forest lands on which they had a right to cut and specific dues based on the amount of wood they cut (36, p. 31).

The American newsprint manufacturers naturally attempted to prevent the Canadian restrictions on pulpwood export and put pressure on the United States government to take retaliatory measures. For example, in response to export duties imposed by Ontario and Quebec in 1900 and 1902, the American government agreed to reduce the duty on low grades of newsprint but, only if the Canadian export taxes on pulpwood were removed. If they

⁶ Although the discussion here is confined to pulpwood, it is noted that government regulations during this period applied to both timber and pulpwood as the two were closely related particularly with regard to local wood operations.

⁷ For example, the proportion of forest land publicly owned and four selected provinces is as follows:

Ontario	-	96.7%	Manitoba	90.9%
Quebec	-	91.7%	British Columbia	- 92.7%

were not removed, the Americans threatened to increase the general duty on Canadian newsprint and levy an additional retaliatory duty. As the Canadian provinces would not agree to reduce their export embargoes the Americans imposed the higher duties on newsprint in 1909 (36, pp. 42-43).

This action primarily hurt the United States newspaper publishers who lobbied to have these new duties removed. They had a study undertaken of the comparative costs of newsprint manufacture in the United States and Canada. This study showed that in Canada labour costs were cheaper, raw material costs were cheaper and the Canadian industry was more efficient. For all these reasons they claimed the newsprint industry would move to Canada in any case and the tariffs merely constituted an unfair burden on the American publishing industry. As Guthrie has pointed out the political strength of the publishers was undoubtedly much greater than that of the newsprint manufacturers and this combined with the relative cost of manufacture settled the issue in their favour.⁸ As a result all attempts at retaliation by the United States collapsed in 1913 with the passage of the Underwood Tariff providing for free admission of Canadian newsprint paper valued at not more than 2-1/2 cents per pound. Since then Canadian newsprint has entered the United States duty free.

The basic success of the policies followed by the provincial governments in Canada was a result of important locational attractions, cheap hydro electric power and the economies of proximity to raw materials. This is clear when it is recalled that the Canadian export restrictions applied only to pulpwood and not to manufactured pulp. Despite the

⁸ For a more detailed discussion of these negotiations see (36, p. 43) and (2, p. 529).

embargoes, newsprint manufacturers in the United States were free, and are still free, to import Canadian pulp and manufacture newsprint from it in the United States. To a small extent the Americans have imported Canadian pulp (880,000 tons in 1925 down to 705,000 tons in 1939 and up to a current level of 1,800,000 tons) (9, 1960), but they have never been able to overcome the greater economies of manufacturing newsprint closer to the raw material and energy sources in Canada (30, pp. 544-545).

During the course of the present century, and particularly after 1913, the Canadian pulp and paper industry has grown in response to the demands of the American market. In 1900 the output of the industry was negligible, by 1913 it had reached 402,000 tons and was the nation's largest export; by 1919 this output had doubled, in 1923 tripled and by 1929 had reached 3 million tons. At present, it is one of Canada's largest industries with a permanent and seasonal employment of more than 300,000. It pays out more than \$370 million annually in wages, purchases more than one quarter of all the electric power purchased and contributes more than five percent of the Gross National Product (30, p. 545).

This is the industry which was built in Canada through a combination of the effects of government policy, an abundant supply of raw material and a mass demand in the United States. But what was the role of government, to what extent were its actions critical? Opinions on the point differ somewhat. Aitkens points out that American imports of Canadian pulpwood began to rise sharply in the last decade of the nineteenth century reflecting an increasing scarcity of pulpwood in that country and lower costs of production in Canada. Had no action been taken by the federal and provincial governments in Canada the result would only have been an increase in exports of unmanufactured pulpwood for processing in the United States. However, these increasing exports of pulpwood would

have taken place at a time when the demand for newsprint in the United States was highly inelastic and prices could have been raised without any serious danger of a decline in the quantities sold.⁹ At this time Canada was in the position of a partial or complete monopolist with respect to pulpwood as there were no other sources on which American producers could draw. Consequently, the advantages were entirely with the Canadians and could have been used to demand higher prices for pulpwood instead of being used to compel the movement of newsprint mills to Canada (2, p. 529).

On the other hand, Guthrie after his study of the development of the newsprint industry in North America concluded that the growth of pulp and newsprint mills in Canada was inevitable:

Both the removal of the tariff and the restrictions on pulpwood exports accelerated the shift of the newsprint industry to Canada. The shift, however, was inevitable. To be sure with the assistance of a tariff the American mills could have resisted the competition of Canadian mills for a much greater period of time. But eventually diminished wood supplies and increasingly higher costs would have forced the mills to move where cheaper wood and power were available. Of the two legislative causes of shift (the abandonment of tariffs by the United States and the restrictions on the import of pulpwood by Canada) the former was much more important. For close proximity to the principal raw material is of such importance in newsprint manufacture that, even if Canadian pulpwood had been allowed unlimited export, most American mills would have remained little if any longer at their original¹⁰ locations if they had not had the assistance of a tariff.

9 It is noted that there has been little change in the production or export of pulp and paper since 1953 except for a slow secular growth. For example, in 1958, 6.0 million tons of newsprint was produced of which 4.9 million tons were exported to the United States. (Source: (9).

10 (36, p. 46). Guthrie also goes on to note that there are those who allege that the specifications of the United States tariff are such as to make it unprofitable for Canadian firms to produce and export to 'the' United States newsprint of a quality higher than that currently sold, even though such a higher grade product could be produced in Canada. Similarly, the United States tariff bars Canadian firms from competing in the American market for high grade coated papers.

Although the development of the pulp and paper industry is often cited as "the classic example of a successful government policy to attract to Canada manufacturing industries utilizing Canadian raw materials,"(2, p.528) it is important to realize that such policies merely capitalized on basic economic forces such as monopoly supply, inelastic demand, the locational pull of cheap power and an abundant supply of raw materials. As Aitkens himself concludes "In the absence of these highly advantageous circumstances, the strategy would not have been effective. The example of the newsprint industry gives no guarantee of success for a general application of similar policies" (2, p. 530).

This is the story of the second great staple upon which Canada's economic development has depended since Confederation. The parallels with and differences from wheat are obvious. The three most important differences are that; it was centred in Central Canada and so did not contribute significantly to the growth of other regions; it resulted in the development of a large processing industry using the staple; and it was oriented in a north-south direction which tended to increase "regionalism". It also had the effect of increasing Canadian reliance on the American market, as it comprises 33.6% of all Canadian imports into the United States compared with 16.6% for non-ferrous metals and 9.2% for agricultural and vegetable products. (2, p. 546).

Mining - Nickel and Iron Ore

Canada is at present one of the world's major suppliers of metallic minerals; it has a virtual monopoly on the world's supply of nickel, it is the second largest producer of gold and zinc, the fourth largest producer of copper and lead, and may soon rank third among the

producers of iron ore (30, p. 533). The bulk of all of these staple mineral products occur in Central Canada. The story of their development and particularly the development of nickel and iron ore has many parallels to the development of pulp and paper. The economic effects on Canada and particularly the Central Region are quite similar to that of pulp and paper, as was the purpose of government action, to have processing and refining done in Canada. However, there were certain key differences in Canada's relative position which made government actions less effective than in the case of pulp and paper and consequently made the attraction of processing and manufacturing to this country a far more difficult and lengthy procedure.

In the beginning, like pulp and paper, it was the development of new technologies and increasing foreign demand which stimulated the growth of Canadian staple mining and not the discovery of the staples. Except for gold, most of Canada's major non-ferrous metal deposits had been known for some time before they were worked on a large and successful scale. Often deposits lay untouched for years after discovery because they were too complex or not of a high enough grade to make exploitation feasible under existing technology (54, Chapter 2). For example, the Sullivan Mine of Consolidated Mining and Smelting was discovered in 1892 and the Flin Flon deposits in 1914. Neither were worked until the 1920's when the development of the selective floatation process made reduction of the complex ores feasible (65, pp. 253-267). In general Canadian mining has always drawn heavily on American technology, and it was not until 1890 that that country began to produce a stream of new equipment and techniques which could be adapted to Canadian use (55, pp. 90-95). During the period from 1890 until

the end of World War I increasing demand in the United States coupled with the solution to the technical problems of working low grade ores influenced the development of Canadian mining, particularly nickel and silver, as was reflected in the increase in the combined output of these two minerals from \$2,000,000 in 1896 to \$26,000,000 in 1913.

It is within this early environment that the nickel industry developed in Canada. As noted above, the Canadian policy with regard to this staple was similar to that for pulp and paper, to attract the later stages of processing (refining) to Canada, but the execution of this policy proved much more difficult. The first nickel-copper ore deposits were discovered in the Sudbury basin of northern Ontario in 1883. The intense exploitation of these deposits started in 1890 with the development of nickel-steel alloys for armour plate.

The first group to gain control of the Sudbury deposits was the Canadian Copper Company which was owned almost exclusively by American interests. It operated smelters in Sudbury and exported nickel matte to the Orford Company which had refineries in Ohio. The key to market control was the ability of the Orford Company to obtain and hold an exclusive contract to supply nickel to the United States Navy Department (the largest user at the time) as well as leading firms in the American steel industry. It was these relationships which enabled this company, and through it Canadian nickel, to gain control of the United States market and to break into the European market in competition with the major producer there, Le Nickel of France which used ore from New Caledonia.¹¹ As a result, while in 1902

¹¹ New Caledonia, the only other major source of nickel ore is a part of the Loyalty Islands, a French territory about 700 miles east of Australia.

Canada had only supplied 45% of the world market for nickel ore and matte, by 1913 it supplied 70% (60% of the European market and all of the American market). Furthermore, the corporate structure proved so successful as a technique for market and supply domination that in 1902 Canadian Copper and Orford were merged into the International Nickel Company which was ultimately controlled by the financial group behind the United States Steel Corporation under the leadership of J.P. Morgan (2, p. 531).

From the beginning of the Sudbury development there was pressure to have the nickel matte refined in Canada. It started shortly after 1890 when Canadian Copper pressed the United States government for a retention of the duty on refined nickel and an abolition of the duty on nickel ore and matte. This was granted as part of the McKinley tariff of that year (nickel ore and matte free, refined nickel 10 cents per pound). Both the Canadian and Ontario governments now pressed for a refinery in Canada, claiming that this had been a provision of Canadian Copper's charter. The company in turn claimed that if it were forced to refine in Canada it would be driven out of the United States market because of the duty. The feeling in Canada ran so high that a rival syndicate was formed which in 1896 appealed to the federal government for an export duty on nickel ore and matte. In 1897 the federal government, reflecting public feeling, passed an export duty on nickel ore and matte of 10% (similar to that in pulpwood). Canadian Copper claimed that they had no refining process of their own and that of their affiliate the Orford Company required skilled labour, cheap chemicals and a market for by-products none of which were available in Canada. As a result, they threatened to close their Sudbury operations if the law came into effect.

This threat proved effective and largely because of pressure from local Sudbury landowners, the tariff was never proclaimed.

The initiative now passed to the Ontario government which had just emerged successfully from forcing the sawn lumber industry to move from Michigan to Ontario by prohibiting the cutting of pine on Crown lands unless the logs were manufactured into lumber in Canada. Proceeding in the same manner, in 1899 the Ontario government pressed the federal government to take action on its bill to impose export duties on unrefined nickel and to ensure that in the future all grants for mining land require that any ore produced be refined in Canada. This appeal produced no results so the Ontario government amended its Mines Act of 1891 to impose a tax on the export of unrefined copper and nickel ores (actually a license tax to be refunded if the ore was refined into metal in Canada). This amendment was to come into effect on proclamation by the Lieutenant Governor. Like the Federal Act four years earlier it was never proclaimed. In part this was because Canadian Copper erected a Bessemer Plant to produce a richer matte; primarily it was because the Orford Company began to stock pile matte in the United States and to develop alternate sources of supply thereby proving that the earlier threat to shut down the Sudbury mines was no idle threat. Subsequent moves by either level of government in Canada were forestalled by the formation of International Nickel in 1902. This company not only completely dominated the American market but it could get ore elsewhere than Sudbury and was in position to prevent the formation of a nickel-steel industry in Canada. Consequently, despite the fact that both levels of government had pledged to get a nickel refinery in Canada they were powerless to do so (2, pp. 532-534).

From the above description it can be seen that the policies which achieved success in newsprint proved ineffective for nickel. The reason for this is that the effectiveness of what are really export duties as a means of attracting industry depend upon two principal factors. The first factor is the degree of monopoly enjoyed by Canada in the principal export market. The second factor is the locational pull of the Canadian resource compared with the locational pull of the United States market. Although in the case of nickel, Canada had massive advantages in terms of production and transfer costs, these were more than offset by the existence of the threat of an alternate source of raw material (New Caledonia) and the market oriented benefits of the then known refining processes (2, p. 129). This nickel policy of the 1890's is an example of the struggle of a raw material area to develop in the face of the concentration of industry in the consuming areas. The desire for this, in the case of the nickel industry, was the realization that the benefits of allowing foreign capital to exploit mineral areas and to ship the raw materials to be processed in other countries were too limited to permit rapid economic development (54, p. 129).

Public policy during the decade and a half after the formation of International Nickel continued to be ineffective. That company always had and used the threat of foreign supplies of ore. Possibly it was ignorance of these alternate supplies that made the Canadian legislators afraid to force the issue and for some twelve years the company functioned quite successfully in a hostile political and social environment under the constant danger of punitive legislation and possible expropriation (54, p. 130).

It was this fear of expropriation compounded by the tensions of World War I and the development of a new refining process which finally caused the company to capitulate and agree to build a refinery at Port Colbourne in 1915. During the war Britain could not be assured of adequate supplies from its traditional European sources and put pressure on the Canadian government to guarantee supplies from Sudbury. A number of commissions met and discussed the possibility of providing a direct subsidy to alternate producers. As a result a new producer, the British American Nickel Corporation was organized to produce ore from the Sudbury field and began refining at Duchesnes, Quebec, in 1920.¹² Under this type of pressure International Nickel capitulated and agreed to erect a refinery. It was opened at Port Colbourne in July 1918. This decision, however, was not taken until after the development of electrolytic refining had made the locational factors of Canada more favourable through the pull of cheap hydro dlectricity reinforcing the pull of the Sudbury ores.¹³

In the end, therefore, it required the development of a new technology that changed the economics of location in favour of Canada to render government policy and action successful and it took over twenty years. This is not unexpected when it is realized that the complex nature of the sulphide ores in the Sudbury basin placed a permium on the development of a successful refining process. In the early history of the industry, only two processes were economically feasible, the one used by Le Nickel in Europe and the one used by the Orford Company (later International Nickel), in the United States. Subsequently the electrolytic

12 The British American Nickel Corporation was purchased by the International and Monde interests in 1924, and the refinery at Duchesnes was closed shortly after that date.

13 It is interesting to note that shortly after the opening of the Canadian refinery at Port Colbourne, International Nickel abandoned their plant at Bayonne, New Jersey as a nickel refinery.

process on which Canadian refining is based was discovered and more recently a fourth process has been tested. The use of the small number of processes was restricted by agreements and patents which limited the number of producers. In this situation, control of both mining and smelting by a process which enabled a company to produce refined nickel was the key to success in the industry. (54, p. 4)

Under such conditions, unless public ownership or direct controls were resorted to government policy was ineffectual in forcing producers to place refining processes in areas other than those dictated by the economics of location.

The story of the development of the iron mining industry is different again from the history of either pulp and paper or nickel. However, in some respects it is similar, for initially government legislation and inducements were provided to encourage the development of the staple and its processing in Canada, whereas technological and locational factors were the effective determinants. It is also similar in that the later and major developments occurred in the Central Canadian Region. The important market is the United States and hence it is one more factor contributing to the north-south regional orientation of the country. Iron ore is another case where the existence of many of the deposits were known for years but were not exploited because of technological problems and the existence of resource deposits more economically situated with respect to the major American and Canadian consuming markets. For example, recent technological developments in exploration, geophysical surveying and transport have made it possible to locate and bring into production vast new mineral resources whose existence was only vaguely known in the past. Such changes have had a dramatic effect on Canada's

iron ore resources in recent years. At the end of World War II Canada's production of iron ore (exclusive of Newfoundland) was insignificant. The highest production in any one year occurred in 1902 when 400,000 tons was produced, a record which was not approached again until 1940, as in 1924 only 72 tons were produced and there was no production between 1925 and 1939. However, by 1952 Canada produced in excess of 5 million tons of iron ore per annum and output was increasing at the rate of one million tons per year. By the middle of the last decade Canada, traditionally an importer of iron ore, had become one of the world's largest exporters of iron ore despite rapidly rising domestic demand. The principal outlet of Canadian ores is the United States and it is forecast that in a few years this country will become one of the leading iron ore exporting nations in the world. (30, p. 530). This recent sudden growth in output has been primarily the result of two developments at Steep Rock and Labrador, both in or very close to the Central Canadian Region.

Prior to World War II Canadian blast furnaces, which were located at Sydney, Nova Scotia; and Hamilton, Sault Ste. Marie and Port Colbourne, Ontario, were almost entirely dependent on imported ore from Newfoundland or the Mesabi ore field in the United States. The largest Canadian ore producing centre in the early decades of this century was at Wabina on Bell Island, Newfoundland. This deposit went into production in 1895, and until 1918 the Dominion Coal and Steel Company of Nova Scotia took two thirds of the output of Wabina, after that date Germany became the largest user. The ores at Wabina contain a high silica and phosphorous content and so are unsuitable for bessemer converting. As

a result they have never found a market in Central Canada. Similarly they have not found a market in Great Britain where the steel industry prefers the high grade Spanish ores. Elsewhere in the Maritimes and British Columbia there were only small developed deposits which were worked in times of emergency.¹⁴ The Precambrian Shield of Ontario and Quebec contains many large iron ore bodies whose existence has been known for years. However, they are mostly low grade ores requiring beneficiation before they can economically be moved. For example, one of the oldest deposits worked in Ontario, the Helen Mine near Michipicoten, contains siderite, an iron carbonate of only 35% iron. Long before Confederation in 1800 a number of small mines did open in Ontario using charcoal, but they were all closed in 1848 when the completion of the St Lawrence canal reduced the cost of imported ores (30, pp. 530-531).

As a result of a lack of known ore deposits in Canada prior to World War II, iron ore and iron and steel products were among the principal items imported from the United States.

In an attempt to alleviate the scarcity of iron made from domestic ores in Canada, the federal government, for a number of years, provided various types of inducements from tariff manipulations to the granting of bounties for pig iron made from domestic ores. When these measures failed to encourage the exploitation of domestic ores the bounties were extended to iron made from any ore just to encourage the establishment of a domestic iron industry.

At Confederation in 1867 iron products were admitted duty free. Over the next few decades duties were generally imposed at rates which

¹⁴ For example, several relatively small iron ore deposits in British Columbia have recently been developed by Japanese capital to supply the short term needs of that countries steel industry.

varied depending largely on the influence of the relevant domestic manufacturers. For example, in 1887 the duty on rolled and hammered bars and steel was raised to 13 dollars per ton and about the same time the duty on a few manufactured goods was raised as high as 35%. During this same period of time the federal government took a much more active role in directly encouraging the domestic iron and steel industry. In 1884 it provided a bounty of \$1.50 per ton on pig iron made from domestic ores. This bounty was continued until 1910, from a high of \$3.00 per ton in 1898 decreasing gradually to a low of .90¢ in the last year it was offered. It was soon realized that the bounty was quite ineffectual in encouraging domestic ore production and, as an iron industry was considered essential to a sound national economy, in 1898 the bounty was extended to pig iron made from imported ores. This bounty ranged from a high in 1898 of \$2.00 per ton declining to a low of 40¢ in 1910.¹⁵ Later, in 1904, the bounty system on a reduced scale was extended to include the manufacture of billets, ingots, rolled wire rods and certain manufactured articles. The purpose of these bounties, along with a graduated tariff structure on steel and its products, was to ensure the establishment of a strong iron and steel industry preferably based on domestic ores, but if that was not practical then on imported ores. The entire system of bounties was stopped in 1912 after some \$17,400,000 had been paid out (55, p. 122).

The only province which directly attempted to encourage iron production from local ore was Ontario. Between 1896 and 1906 that province paid a bounty of one dollar per ton for pig iron made in Ontario

¹⁵ The actual bounties granted between 1898 and 1910 were as follows: 1899 through to 1902 inclusive-\$3.00 per ton; 1903 and 1904-\$2.70; 1905-\$2.25; 1906-\$1.65; 1907-\$2.10; 1908-\$2.10; 1909-\$1.70; and 1910-\$0.90.

from Ontario ores. Later, in 1923, Ontario paid a bounty of "one half of a cent per unit of iron ore per ton" (later raised to one cent) to help defray the cost of beneficiating carbonate and other ores which cannot be sent to the blast furnace without preliminary treatment (55, p. 122). This latter bonus was intended to encourage the operation of known mines such as the Helen Mine at Michipicoten and was offered for only a few years. This technique of the double inducements of tariffs and bounties was a complete failure in its prime purpose of encouraging the domestic production of iron ore, although it did succeed in its secondary purpose, the establishment of a Canadian iron and steel industry. The former purpose, i.e. the exploitation of the remote and complex Canadian iron ores, had to wait more than thirty years until the development of new technologies and the anticipated exhaustion of the existing iron ore deposits serving the bulk of the steel industry in North America made it economic to do so.

The development of the two major industrial metallic minerals of Canada described above, although different, have many similarities. In both cases official policy strived to have the extraction of the staple ores serve as the foundation for a Canadian refining and processing industry. In both cases this policy was unsuccessful until technological innovations and market factors in the United States had changed to make such processing economically feasible in Canada. The importance of the final growth of mineral processing and refining to Canada cannot be overlooked. It is pointed out by some of the findings of Moore. In summing up the significance of mining to the Canadian economy in the 1930's he stressed the jobs dependent on the output of minerals. He pointed out that one seventy of Canada's population depended for support on the workers

employed directly in mining and indirectly in processing, transporting and distributing the products of mining activity (56, pp. 39-40). This latter form of activity is now far more important than providing for the needs of the mines, the needs of the miners and in many instances the actual mining activity itself. What this means is that between the two world wars there was a great expansion in the industries which smelted, refined and fabricated Canada's primary metal output and by the start of World War II the bulk of the smelting and refining was carried out in Canada and fabricating industries were beginning to develop. "This was a long stride from the position on the eve of the previous World War, when Canada was only a relatively small shipper of ores and concentrates to foreign refineries." (65, pp. 253-268)

Innis has stressed the importance of energy as perhaps the most important economic factor determining whether Canadian minerals would be refined in Canada or in the United States. He points out that the heavy, bulky, cheap characteristics of coal gave it a dominant position in determining the location of refining and processing activity in the earlier part of this century. This commodity, like any commodity consumed in the process of utilization, has the tendency to pull all other materials towards its place of extraction. The limited coal resources of eastern Canada tended to favour the export of ores to the United States and it was only in the St. Lawrence valley where cheap water transportation and government protection attracted coal from Nova Scotia (to Montreal) and the United States (to Toronto) that refining and processing could take place. Furthermore, it was only when cheap hydro-electric power and new techniques of refining based on electrolysis were developed that refining and processing of base metals could economically move to the mineral producing areas (55, Intro.).

Consequences of Later Staple Development

The great bulk of the expansion in the production of pulp and paper and minerals which occurred in Canada during the first half of the twentieth century took place in Central Canada. Between 1911 and 1951 employment in forestry tripled and in pulp and paper it increased five fold. The quantity of nickel produced increased by eight times and that of copper twenty times. Iron ore output increased from virtually nothing to nearly 3,000,000 tons and the output of aluminum based on hydro electricity increased from 4,900 tons in 1910 to 447,000 tons in 1951 (19, pp. 193-4). These new export staples were being developed during the same period of time in which Central Canada became established as the industrial heart of the nation. By 1951 Ontario and Quebec accounted for 81% of the total manufacturing in the country. Although a large part of this output consisted of consumer goods for the internal domestic market, a very important factor was the growth of the new forest and mineral export staples and their processing (19, pp. 188-189).

Another feature of this period was the continued dependence of the Canadian economy on international trade and particularly the dependence of the Central Canadian economy on trade with the United States. This of course was to be expected because of the proximity of the major consuming markets in that country to the sources of the new staples in Canada, and the fact that the Americans are the largest producers and users of minerals in the world. Also, Canada used American methods, purchased American milling and smelting equipment, used American geologists and technicians and, perhaps most important, American capital controlled many of the larger Canadian mining companies (55, p. 134). The evidence points to the fact that the growing demand for Canadian

staples in the United States and the strength of that country's marketing and financial connections in Canada will continue to pull the two economies closer together.

To many Canadians this trend has a number of unpleasant consequences. For example, Easterbrook and Aitkens, in their economic history of Canada, acknowledge that United States funds have strongly supported Canada's economic progress in the twentieth century but contend that that country's commercial policies have tended to run counter to the trend of development in Canada which her foreign investments have stimulated. They conclude that:

A nation as industrially advanced as Canada and as heavily dependent on external markets is unlikely to accept complacently a situation in which a large proportion of her exports continue to leave the country in raw or simple processed form and in which she is faced with the uncertainties of frequent and unpredictable changes in her export trade. If this situation persists, there is a strong likelihood that defensive measures will take on a new importance. These will probably appear as a strengthening of existing pressures for a national policy designed to improve Canada's position as a producer of the complex and finished products of modern industry. (30, pp. 579-580)

The nature of the economic relationship between Canada and the United States, however, has been well founded over a long period of time. It is no longer a casual relationship of buyer and seller. Since early in the twentieth century American capital has flown into Canada principally to accelerate the development of the sectors of our economy that will serve the United States market, i.e. along lines that are complementary to the economy of that country. As the United States is highly industrialized with a productive agricultural sector, the products required have been and still are principally industrial raw materials. The structure of the American tariff reflects and re-inforces these pressures

as does the movement into Canada of American technical skills and entrepreneurship. In effect, the impact of the United States on the Canadian economy has been selective. Although, there has been some secondary manufacturing industries, e.g. automobiles and rubber, which have been dominated by subsidiaries of United States corporations, the greater portion of American investment has been in the primary sector, particularly metallics, wood products and petroleum. This is reflected in the post World War II export pattern as in 1962, 59% of all exports were to the United States of which almost 60% consisted of paper and non-ferrous metals. Also since World War II, 70% of all United States investment in Canada has been in petroleum, pulp and paper and mining. (2)

To many Canadians the above described trend appears undesirable for political as well as economic reasons. They would like to see a greater diversification of the economy and less dependence on external markets, particularly those in the United States. In other words they would like a situation in which control over the future direction and growth of the Canadian economy rested more in the hands of Canadians themselves and less in the hands of foreigners. The attitude itself is understandable, the suggested policies to which it gives rise, however, are of questionable effectiveness and rarely show an appreciation of the real cost of nationalism.

In effect, Canada has not as yet been able to devise a generally effective means of protecting export industries and their growth comparable to the tariff as a protection for domestic industries. This inability in many respects stems from the fact that Canadian development has necessarily depended on the exploitation of market and resource opportunities as they appeared. This in turn has involved extensive

participation of American capital and entrepreneurship in Canadian industries and has tended to mould the structure of the Canadian economy into patterns complimenting the needs of the United States. The rapid growth of the Canadian economy in the past has largely depended upon this foreign influx. Not only are there no indications that this pattern can be significantly modified by government policy, but any attempts to do so are liable to involve real costs in terms of retarding economic development as they would have to involve restricting the import of capital and entrepreneurship from the United States, controlling the actions of the operations of American subsidiary companies in Canada, and regulating the marketing of Canadian exports. Because of these real dangers perhaps the solution which Aitkens suggests is the most logical solution to the problem and the one which will develop naturally through the force of economic circumstances. "The expansion of the internal market in Canada, the development of a manufacturing sector to serve that market, and the establishment of a strong diversified resource base are likely to be more effective in modifying the pattern of Canadian dependence." (2, p. 548)

The development of and the economic role which has been assumed by the new staples of wood and minerals have not supplanted the older staple wheat, rather they have supplemented it and reduced the extreme dependence of the national economy upon it. However, the new staples have had relatively little effect on the direct or local pattern of settlement, primarily because of their highly capital intensive nature. Furthermore, these new staples have had another influence, in that as the lines of international trade they have fostered tend to be north and south, to

an increasing degree they tie in the various regions of the country to the adjacent areas of the United States. In other words, in contrast to the older transcontinental influence of the wheat period the growing American demand for Canada's resources is strengthening the divisive influence of geography. (30, p. 407).

CHAPTER II

INDUSTRIAL DEVELOPMENT AND LOCATION THEORY

Staple Exploitation and Growth of Industry in Central Canada

A basic factor in the growth of the Canadian economy since Confederation has been the stimulus of the three major classes of export staples described in the previous chapter. Furthermore the development of the Canadian economy during the past 95 years has taken place within the context of a basic change in the nature of world industrialism and particularly that of Europe and North America. This change in the nature of industrialism in itself had profound effects on the scope and shape of the Canadian economy; particularly as the manner in which it effected the demand for staple products, and the technological stimulus which it provided to the means of production had a particular influence in shaping the industrial structure which grew up in Central Canada.

Three stages of industrial development have been delineated in Europe and North America (30, pp. 517-519). First, there is what has been termed the "pre-industrial" period of the seventeenth and early eighteenth centuries. This period is characterized by the use of wood, wind and water as the source of energy, wood as the principal construction material and economic activity located close to sources of food. Secondly, there is what has been called the "old industrialism" of the nineteenth century and the first few decades of the twentieth century which was characterized by the use of coal as the principal source of energy, iron and later steel as the major construction material, steam engines as the

basis source of motive power and activity located close to the source of coal. Thirdly there is the "emerging new industrialism" of the twentieth century which is still underway. This period is characterized by hydro electricity, petroleum and natural gas as the principal sources of energy; aluminum, light alloys and alloy steels as the basic construction materials; and the internal combustion engine, aircraft, trucks and automobiles as the basic source of motive power. This latter period is also one during which a variety of new industrial processes have been and are still being evolved such as the reduction of complex ores by electricity and the development of new synthetic materials.

Great Britain led the way in and was the main location for the "old industrial system". This industrial system, which was based on iron, steel and steam, demanded for its existence large amounts of coal and iron ore in reasonable proximity to each other. This was necessitated by the fact that during the nineteenth and early twentieth centuries the existing technologies required vast amounts of heat and energy which could only be obtained from coal. Since coal is a heavy commodity which is entirely consumed in the manufacturing process, industrial activity tended to be located close to its source. In contrast to the pre-industrial era, which was much more labour intensive and hence located close to its major weight losing material food, the old industrial system could be fairly remote from food sources as long as the cost of transporting food from these sources was relatively inexpensive. In part this explains the rapid growth of the Prairie Region in Canada. At the turn of the century, that region became one of the most inexpensive sources of food available at that time to the British industrial machine.

The specific type of industrial structure which will evolve in the world as a result of the effects of the new "industrial era" is still a matter for speculation. However, in Canada where industrialization has taken place almost entirely within the context of the new technological possibilities of the new era, the main structural features are becoming clear. The main stimulus to industrialization in Canada was provided by the breakdown of the older nineteenth century world economy, as illustrated by the industrial growth which occurred during the two world wars. Between 1914 and 1918 the output of non-ferrous metal refining in Canada increased from \$129 million to \$211 million and that of steel from one to 2.25 million ingot tons. During the last two years of the war new Canadian factories and shipyards produced 3,000 military aircraft and 350,000 dead weight tons of shipping. During the second World War the industrial base was much broader, steel output increased 120% between 1939 and 1942 while the output of aluminum increased by 500%. In addition major output records were established in relatively new industries such as tool making, electrical apparatus, chemicals, synthetic rubber and magnesium. From the foregoing it can be seen that Canada during the twentieth century has become a part of the new industrial era. Furthermore, its participation has not been restricted only to wartime¹ or to the position of a supplier of unprocessed staples.

The key role which exports of Canadian staple products played in the process of building up an industrial sector in the nation's economy cannot be overlooked. Analytical techniques such as input-output analysis

1 For example during the early inter-war period and particularly between 1926-29 the volume of manufacturing investment reached levels which were not surpassed even after World War II. The major fields of investment in the decade of the twenties were pulp and paper, automobiles and non-metallic minerals.

(also called inter-industry analysis)² show that in Canada increasing staple or primary output has been a tremendous stimulus to the rest of the economy because of the strong upward interindustry connections plus consumers' high income elasticity for manufactured goods. Conversely, the expansion of the manufacturing and service section of the economy as independent forces offers little stimulus to other sectors of the economy. This relationship is illustrated in Table VI.

TABLE VI
EXTENT OF INTER-INDUSTRY RELATIONS OF PRIMARY,
SECONDARY AND TERTIARY INDUSTRIES IN CANADA
(Millions of Dollars)

<u>Sector Where Total Output Affected</u>	<u>Sector Where Final Demand is Increased by 100 Million Dollars</u>			
	<u>Primary</u>		<u>Secondary</u>	<u>Tertiary</u>
	<u>Agriculture, Fishing, etc.</u>	<u>Extractive Industries</u>	<u>Manufacturing & Construction</u>	<u>All Service</u>
<u>Primary</u> Agriculture, Fishing, Hunting & Trapping	104.5	2.8	11.4	4.2
Extractive (Mining and Forestry)	1.6	102.2	6.1	2.7
<u>Secondary</u> Manufacturing and Construction	32.8	24.8	145.6	33.0
<u>Tertiary</u> Service and Unallocated	34.6	38.8	41.9	125.5

SOURCE: Adapted from (19, p. 124); Data obtained from (11, Table 1).

The table shows the extent of the increase in output in each of the major sectors of the economy, if the output in one sector only is increased by 100 million dollars. It can be seen from this example that the secondary and tertiary sectors of the economy are much more sensitive to

² See the input-output analysis of the effect of meat packing on the Manitoba economy in Chapter IV pp. 139-167.

changes in the final demand for primary output than vice versa. It can also be seen that the secondary and tertiary sectors of the economy are quite sensitive to changes in the final demand in each others output, but that the two sectors of the primary industry are not at all sensitive to changes in the demand for each others output.³

Although the proceeding analysis does show to some extent the manner in which the staple exports of Canada fostered industrial developments, it gives no indication as to where the industrial structure developed within the country. As indicated in the previous chapter,⁴ this occurred primarily in Central Canada. The St. Lawrence lowlands were the commercial centre of what is now Canada long before Confederation and by 1867 a primitive manufacturing area providing for some of the needs of lumbering and agriculture was in the process of formation. By the early 1900's this nascent industrial area had been immeasurably strengthened by the demands of the growing Prairie Region. In the prairies the ratio of exports to total production was higher than in any other region of Canada. The purchase of goods and materials by the three western provinces from the rest of Canada was far in excess of their sales to the other regions. In addition, they imported vast amounts of capital from Central Canada and abroad. In effect the people of this region used part of the foreign exchange which they obtained from exports and from capital imports to purchase goods abroad but spent most of it on eastern and British Columbia goods and services.⁵ At the same time, in Central Canada the sales of goods and materials to other parts of Canada were high and greatly in excess of

3 It is noted that this technique reveals little about the degree to which one sectors total output depends upon the level of output of another sector. The results show only the absolute measure of changes in one sector which are induced by relatively short run changes in the demands of another sector.

4 See Chapter I pp. 65-66.

5 During this period, the only material received by the Prairie Region in quantity from British Columbia was lumber.

purchases from them. In addition the region was a net exporter of capital to other regions. After 1920 the rapid growth of the new staples, pulp and paper newsprint and base metals, tended to concentrate industry to an even greater degree in Central Canada as these staples were all located within that region in proximity to the industrial area.

Since Confederation the economic forces which have fostered the location of the industrial heart of Canada in the St. Lawrence lowlands of the central region have been strengthened and accelerated by the actions of government policy. Such measures as subventions on coal, the protection of iron and steel industries; the construction of the railways, and the institution of preferential rates of duty with Empire countries have all tended to foster the growth of secondary industries in that region. Later when hydro electricity became a substitute for coal for energy and heat, its use was encouraged, particularly by the Ontario government, to make feasible the location of new industries such as refinery plants near ore deposits as well as the further growth of the secondary industry complex (55, pp. XII-XIII).

Government policy, particularly in the form of tariffs, not only helped to accelerate the industrial growth of the Central Region but in the opinion of some authorities did so at the expense of the growth of export oriented regions such as the prairies. For example, in his work for the Royal Commission on Dominion-Provincial Relations, Mackintosh made the following comment on the effect of tariffs on regional growth:

The tariff imposes limitations on export industries and export regions; the limitations ultimately, and in the main, affect incomes derived from the ownership of resources used in the production of export commodities rather than on other incomes in the export region. As long as the export regions were expanding, as long as the "export-property" incomes and values were rising, the limitations imposed by the tariff were borne with little difficulty and no great complaint.....When, however, expansion gave way to contraction in the export regions, when incomes from resources were no longer rising but falling, demands for relief for the export regions through tariff reductions increased in number and instances (53, p. 83).

Mackintosh goes on to conclude that without tariffs Central Canada would have a smaller proportion of the total national population than it now has and the extent of industrialization and urbanization would be less. However, he recognizes that regardless of tariffs Central Canada has so many natural advantages that it would still be the most highly developed region in the country (53, p. 87).

Requirements for the Industrial Structure in Central Canada

Earlier it was indicated that industrialization in Canada has taken place entirely within the context of the emerging new industrialism of the twentieth century and that this new industrialism was based on the energy sources of hydro electricity, petroleum and natural gas.⁶ Neither petroleum nor natural gas are indigenous resources of Central Canada in any significant quantity nor were they readily available to the region until the pipelines from Alberta were constructed less than a decade ago. Consequently, hydro electricity has been the key to much of the growth of secondary industry in that region during the past four or five decades, particularly since potential water power sites are so plentiful in the area.

⁶ See the previous section pp. 70 & 71.

This is the thesis of J.H. Dales in his study of the industrialization of Quebec (24). He argues that the development of hydro electricity was the agent which promoted the rise of twentieth century industrialism in Central Canada in that it enabled that area to expand its economic base from the exploitation of a few natural resources to a far greater diversity of activity. However, he goes much further than this, in that he also claims hydro electricity should be considered as another "staple industry" in Central Canada as it assisted in the application of "mature techniques" to virgin natural resources for export in such forms as pulp and paper and aluminum. In this respect he points out that although on a somewhat smaller scale, the hydro electric industry resembles the railway in many ways. The power station succeeded the railway as the main development agency in the country, as a major field for investment and as an outlet for engineering energies (24, p. 184).

That there is some merit in Dales' view is shown by the recent growth of the aluminum industry in Canada which is an industry typical of the "new industrialism". Canada is at present one of the largest aluminum producers in the world. The three raw materials required for its production (bauxite, cryolite, and petroleum coke) are not found in Canada and must be imported. All that this country has is inexpensive hydro electricity, and the story of aluminum development is the story of the search for and development of large quantities of low cost electricity. The typical aluminum refinery is found near a large source of water power, in a relatively isolated area where there is little competition from other industrial power users, and close to deepwater harbour facilities where bauxite supplies can be unloaded (30, p. 546).

Although the cheapness and abundance of hydro electric power in Central Canada allowed for the dramatic growth of such staples as aluminum and pulp and paper it also supported the general growth of manufacturing. Canada has a total potential turbine capacity of 51,780,000 horse power. In 1960, some 25,000,000 horse power were installed; 11,400,000 in Quebec, 8,000,000 in Ontario, 3,500,000 in British Columbia, 1,300,000 in the Prairies (mostly Manitoba) and 800,000 in the Maritimes (including Newfoundland)(9, 1960). This means that Central Canada has approximately 78% of the nation's developed hydro electric capacity. There are some writers who believe that the availability of electricity has contributed to inter-provincial differences in the industrial development of Ontario and Quebec (19, pp. 192-193). They point out that Quebec is the centre of light industry such as cotton yarn and cloth, men's clothing, women's clothing, butter and cheese, and tobacco products, none of which are predominant in Ontario. Conversely, Ontario is the centre for heavier industry such as motor vehicles, primary iron and steel, heavy electrical machinery and agricultural implements. One of the main reasons for this is claimed to be the sources of power available to the two provinces. Ontario is close to the Appalachian coal fields which tends to foster the growth of heavy industry with its large heat requirements. Not only is Quebec farther from the coal fields, and until the completion of the Seaway an economic form of water transportation but it has more than twice the installed hydro capacity of Ontario, a form of power ideal for light industry as well as aluminum and pulp and paper.

Dales' has argued that under certain basic assumptions a region must have at least 50% of its own material requirements (defined

as including power and food needs) if industry is to develop (24, pp.156-181). Based on Dales' estimates the Central Region appears to have about 60% of the requirements for light industry. But this requires all of the area's hydro power, food and forest resources and it is through the fortunate juxtaposition of these resources in the region that it has developed into the industrial heartland of Canada (19, p. 193). Dales himself points out that his entire concept is meaningful only if it is assumed that an industrial structure has some minimum critical size and some critical volume of output exists above which a region will have a viable industrial economy and below which there can be no industrialization in the common meaning of the word, although there may be isolated manufacturing establishments. This, he goes on to admit, is difficult to prove but he points out that industry is concentrated regionally and not spread out over the face of the earth. Furthermore, industrial development tends to be a case of feast or famine with moderation the exception although different types of industrial structures tend to develop with different compositions and so different material requirements (24, p. 262).

Let us examine Dales' thesis further as it applies to a light industrial structure and the model by which he attempts to show that such a structure exists in Central Canada. In the first instance, he assumes that light industry is synonymous with secondary industry and includes all manufacturing save that engaged in transforming natural resources into industrial raw materials. The total consumption of raw materials in Central Canada in 1949 as presented by Dales is shown in Table VII. This consumption must be adjusted to exclude primary iron and steel manufacture and the output of basic export industries such as pulp and paper manufacture

and non-ferrous metals extraction including their energy requirements. In addition other energy and fuel requirements must be subtracted leaving only that required for secondary manufacture. When this is done the important materials become food, energy and raw materials which exist in sufficient quantity within the region to provide the 60% of the requirements mentioned above.

Dales goes on to discuss the possibility of more than one region in a national economy, such as that of Canada, developing a self-sustaining industrial structure. He points out that this can only occur if two or more regions have more than 50% of the requirements, and if the aggregate resources of all the regions in the national economy are sufficient to support two or more industrial structures.

TABLE VII
TOTAL CONSUMPTION OF INDUSTRIAL RAW MATERIALS,
CENTRAL CANADA, 1949

<u>Type of Materials</u>	<u>Consumption</u>	
	<u>Millions Tons</u>	<u>Per Cent</u>
Fuel Resources		
Coal	4.2	
Petroleum	1.4	
	5.6	21.4
Power Resources Hydro (Coal Equivalent)	6.1	23.4
Food Resources	4.6	17.6
Iron & Steel Requirements	3.8	14.6
Forest Resources	3.8	14.6
Wood	2.4	
Paper	1.4	
Other Raw Materials	2.2	8.4
Mineral	0.5	
Agriculture	0.8	
Chemical	0.9	
<u>TOTAL</u>	<u>26.1</u>	<u>100.0</u>

SOURCE: Adapted from (24, p.193)

However, if two or more regions have more than 50% of the material requirements for an industrial structure but the aggregate resources of the economy are sufficient only to support one industrial structure, then that region with the greatest share of the resources or to which the cost of transporting resources is minimal likely will be the region in which the industrial structure develops. Similarly, if no one region has the more than 50% of the material requirements but the aggregate of the resources of the total economy are sufficient to support one industrial structure it will occur, if it occurs at all, in the region with the largest proportion of the material requirements (24 p. 262). In summary, by implication it is Dales' contention that Canada has only one self-sustaining industrial structure which is in the St. Lawrence valley of the Central Region. Further, an examination of the material and energy output in the other regions of the country would lead to the conclusion that the national economy cannot support more than one such industrial area although other regions can and do support particular industries or industrial complexes based on a particular local resource advantage.

The fact that the major industrial area in Canada is in Central Canada is to be expected. Not only has the nation's development favoured industrial concentration in this area as has the abundant staple materials which exist in its hinterland, but it has also received stimulus from south of the border as it is really a northern extension of the major industrial region in the United States. This latter factor is particularly apparent when it is considered that the industrial pattern, business methods, technologies, firm sizes and relative industry sizes are about the same in

both Canada and the United States. It is recognized that there are some differences in the industrial structure of the two countries and that Canadian industries tend to be more highly concentrated than similar industries in the United States. The reason for this tends to be that while firm sizes tend to be similar in both countries, the total size of the industries in Canada is smaller. This suggests that further growth of the Canadian economy will tend to reduce the level of concentration of industry and bring the structure of these industrial areas in the two countries closer together.⁸

Location Theory as it Explains Canadian Industrial Growth

Over the years a body of economic literature has been developed which is directly concerned with the phenomenon discussed in the previous section, why does industry tend to concentrate into regions or areas, what are the relations between regions that are and are not industrially oriented and under what conditions can a region become industrialized. A number of theories have grown from this activity which, although often separate and not unified into a cohesive whole, have collectively become known as "location theory". Let us now examine some of the main aspects of this theory to determine their relevance to Canada and particularly the significance of the present industrial structure in Central Canada as it is liable to influence the future growth and development of the Prairie Regional economy.

Walter Isard claims that all economists normally discount space and in so doing recognize and allow for one of the key aspects of location theory in their analyses, or as he put it:

⁸ For example, between 1922 and 1948 concentration in Canadian manufacturing tended to decrease as market size increased proportionately faster than firm size.

Though economists have never spoken explicitly of spatial discounting, nonetheless they have performed the operation. In doing so, they have most frequently been considering a one-point market served by a surface producing area (as we find in farming). In such a case the farther the site of production from the market the more the market price is discounted to yield the net price on the output of that site (46, p. 85).

With respect to the relationship between general economic theory and location theory Isard has the following comment:

We must recognize the obvious fact that economic activity takes place in a time-space continuum. In general, to minimize effort or factor services in producing a given social output or to maximize social output with a given amount of effort and factor services, is not to choose a path of action with respect to time alone, or to the space axis alone, but rather with respect to both axis (46, pp. 77-78).

In effect what Isard has said is that no analysis of the development of an economy can be complete unless it takes into account the factors which have caused specific forms of activity to locate in specific areas. Just what are these factors causing particular locational configurations of activity? Obviously they are varied and complex. Up to certain limits they may be almost entirely fortuitous, as when a locality with an early start in some industry obtains a competitive advantage that it may retain and increase even though the early start was due to pure chance or whim. However, the above case tends to be exceptional as production and consumption are normally interdependent. Ultimate consumer market patterns tend to be determined by the geographic distribution of consumer income, which in turn is influenced by the location of production. To the extent that production seeks to locate near its markets and at the same time creates market demand, locational changes can be cumulative. It is evident therefore that actual locational patterns cannot be explained merely in terms of the distribution of natural resources or population at any given time (39, pp. 3-4).

Speculation about the economic forces of location began in Germany some one hundred and fifty years ago when Von Thunen published his treatise on the location of agricultural production.⁹ In his work he assumes a uniform plain of equal fertility and so equal possibilities for agricultural production at all points. In the centre of the plain is a city which consumes the output of the area and which possesses potential transportation facilities of similar character in all directions (i.e. transport costs proportional to weight and distance). In such a situation production of agricultural crops will align itself in rings around the city in accordance with the price and transport cost of each particular product cultivated. Although this is a very limited theory it does contain a methodology in analyzing specific as well as general locational problems which gives Von Thunen the position of the father of locational theorists. However, Von Thunen wrote before his time and his theory was not really expanded on until 1909, when Alfred Weber published his theory of the location of industries (72). Essentially Weber's theory was evolutionary in its approach and attempted to explain the transformation of the locational structure within an economic region through to an industrialized society.¹⁰ To do this he divided the economy into strata which appeared historically. These strata consisted of agriculture, other primary industries, secondary industries (which form the basic core of an economy); officials and businessmen; and finally a central dependent strata. In his theory it is the interplay between these strata

9 (67) - Source of this discussion on the writings of locational theorists is Walter Isard (46, pp. 27-50).

10 It is noted that Alfred Weber was greatly influenced by the writings of Wilhelm Roscher (62) and A. Schaffle (64) who were both of the German historical school and who were primarily concerned with discovering whether there are any laws or regularities in the evolving locational structure of economies. Their main contribution was in the collection of historical facts and the presentation of an abundance of conflicting ideas.

as they develop that really determines the locational structure.

Following publication of Weber's thesis two other Germans, Oskar Englander (30) and Hans Ritschell (31) published further works on locational theory in 1926 and 1927 respectively. Both of these writers adopted Weber's stratified classification of the economy and neither really advanced his theory but merely elaborated on it. Englander concentrated on the concept of a producer locating at the point of maximum advantage from the viewpoint of supply and distribution costs and the fact that a new producer will influence the overall cost price pattern. Ritschell concentrated on the historical relevance of locational factors and traced development through periods of village, city, national territories and a world economy. Later in the 1930's two economists of the English historical school, A.P. Usher (69) and W.H. Dean Jr. (27), examined aspects of the developing geographic patterns of population density and the relations of these patterns to localized resources. The purpose of their investigations was to determine the significance that regional resources possess under the technological conditions of each historical period. Although they both studied various aspects of this general problem neither attempted to put their findings within a unified framework or to develop a general theory.

It was not until August Losch published his work in the economics of location in 1940 (51) that the first real attempt was made at a general equilibrium analysis of location forces. By using a model, the basis of which was a condition of monopolistic competition, Losch attempted to encompass the general spatial relations in a set of equations and in

doing so developed the familiar hexagonal shape of market structure. Although his technique has severe limitations in that it minimizes the elements of interdependence and treats the space economy not as a whole but as consisting of major sectors, for the first time it attempts to encompass spatial relationships within a single framework.¹¹ Finally, in 1948 Edgar M. Hoover published his "Location of Economic Activity"(39). Hoover's approach resembles the evolutionary approach of the earlier German writers. By carefully drawing up a set of assumptions and relaxing them one by one he is able to proceed from an analysis of extractive industries to a treatment of manufacturing first under simple and then more complex conditions. He emphasizes the major specific forces at work and does not pay too much attention to the interrelationships especially when they can only be stated in broad terms. "In this way he is able to synthesize the various theoretical contributions of his predecessors that are of practical value and by employing illustrative empirical material is able to stick close to reality." (46, p. 30 ff.)

The general body of literature on locational economics, largely as propounded by the writers described above, indicates that there are three geographic contexts in which the location of industry can be considered. Firstly, one can consider the urban centre as the geographic unit and discuss the industrial configuration of cities and towns. Secondly, one can consider the economic region as the geographic unit and discuss the pattern of industrial location within the region, i.e. the division of industry among different towns and cities. Thirdly, one can consider a multi-regional area such as a political unit and discuss the

11. For a general discussion and critical evaluation of Losch's theory see Walter Isard (46, p. 42-49).

division of industries or industrial areas among the regions. According to Dales, one of the problems of using location theory to explain inter-regional growth is that ever since Alfred Weber wrote on the subject the main stream of locational theory has been devoted to a study of the location of an individual industry (or firm) between different sites within a region. The conventional microscopic location problem is to explain the location of an industry according to the location of raw materials, energy resources, labour supply, and the market; all these being geographically fixed from the point of view of the individual industry (24, p. 169). The macroscopic problem of interregional growth and interregional industrial development with which we are concerned here is different from the microscopic problem, particularly with respect to the fixed nature of the factors. The only factor which remains truly fixed is that of raw materials; all the others can and do change during the course of the development of a region. Isard has recognized this difference by considering individual industry location theory and interregional location theory as fairly distinct and separate. For example, he claims that interregional location theory is quite similar to trade theory, in that the main difference of trade theory is that it introduces certain man-made restrictions into interregional theory. As he puts it: "Practically all location doctrines, such as labour orientation, power orientation, agglomeration, etc., can now be adopted and employed in trade theory; and similarly, all development in long run trade theory can be adopted and employed in location theory" (46, pp. 219-220).

The concern of location theory with microscopic analysis as discussed above has necessitated some modifications for macroscopic or interregional analysis. Dales made such modifications as a basis for his model of Central Canada. He assumed that the market and labour supply are not fixed, in fact these are determined in large part by the interregional industrial structure itself, and so they are removed from the analysis. Omitted also are such factors as climate, water and building materials such as stone, gravel and clay. Although these latter factors can and do have a bearing on particular industrial locations they tend to be ubiquitous and of little total consequence as far as regions are concerned. The important factors which tend to be geographically fixed and which must be considered in interregional analysis are energy resources and materials, agricultural resources for food production and industrial raw material resources such as agricultural products other than food, forest products and mineral products. In relation to these factors the principle by which the location of production is determined interregionally is the same as in the more conventional location analysis; production will tend to be located in the region where transportation costs are minimized (24, p. 169).

Isard essentially agrees with the foregoing as an approach to the interregional problem although his approach is somewhat different to that of Dales. He recognizes three different types of locational factors: those of a physical nature, agglomerative and deglomerative forces, and transportation. The physically oriented factors are costs associated with labour, power, water, taxes, insurance, interest, climate, topography, social and political milieu and a number of other related items. The geographic

cost pattern of many of these items may be stable and if they do vary it is haphazardly and irrespective of direction or distance. Elements giving rise to agglomeration include the economies of scale, localization and urbanization; those causing deglomeration include the diseconomies of scale, rise of rents in centres of urbanization and rising food costs as increased population compels resort to surplus agricultural areas further afield.¹² Transport and certain transfer costs are particularly important in that they vary regularly with distance from any point of reference usually increasing in a step fashion as distance increases. Isard concludes that in regional analysis the only factors enumerated above which are relevant are transportation costs and the other costs which are related to distance (i.e. vary with distance in a regular manner) (46, pp. 138-139).

Within the context of the factors outlined above as being important in determining regional and interregional industrial location, there are two approaches possible to explaining the phenomenon of differentiated regional development or the fact that different regions at different times will have a different mix of industries or industries of different types. The first approach is what has been termed the "Walrasian" mechanism whereby particular industries will appear in different proportions in different regions. The second is the "Marshallian" mechanism whereby factor proportions used in each industry will vary among regions but overall industrial patterns will or may be roughly similar (24, p. 160). Dales claims, that in the case of twentieth century industrialism and the variable geographic resource base of North America, adjustment to regional differences

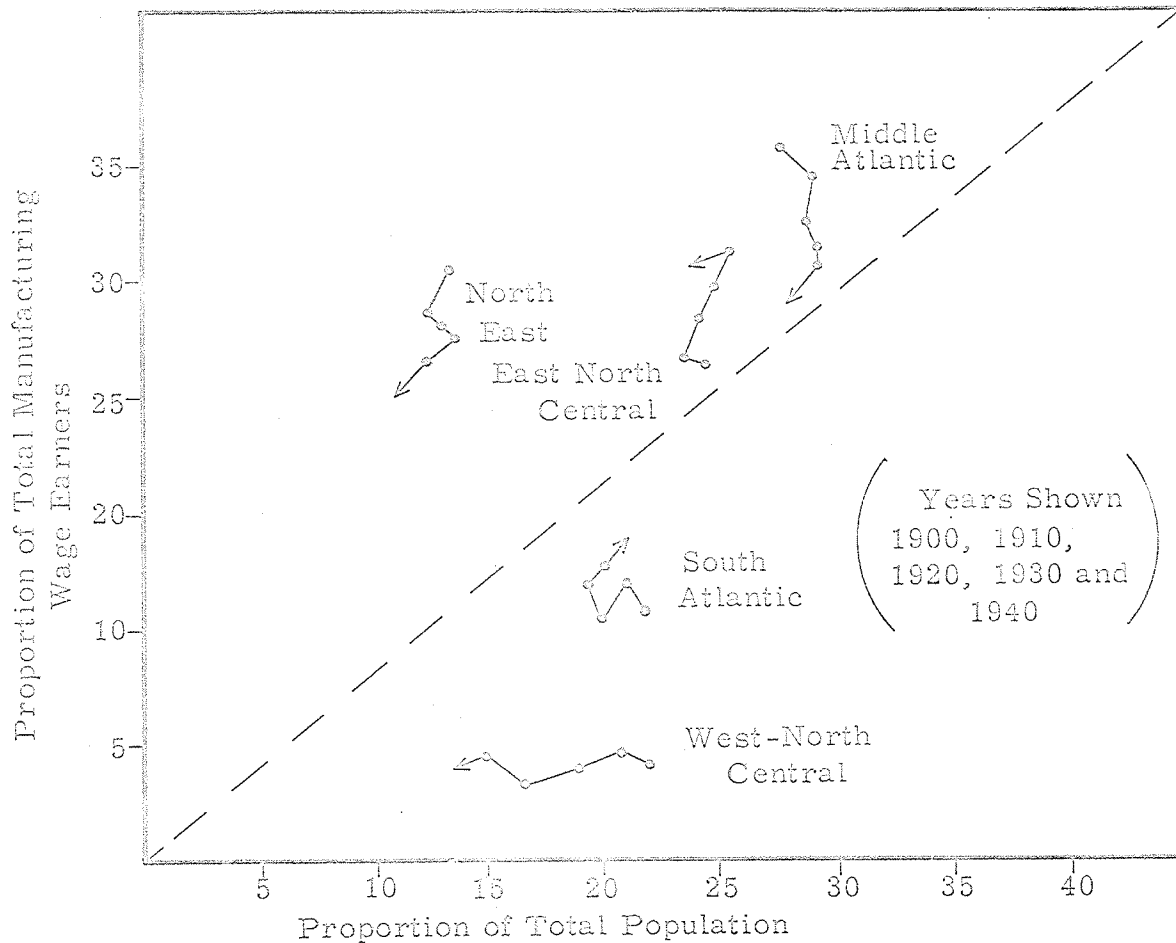
¹² In this regard it is important to note that different technological factors have differing effects on urban versus regional areas. For example, there is evidence that the development of truck transport and the electric motor are having a decentralizing influence on urban development (allowing the urban centre to spread out) but a centralizing influence on the concentration of industry on a few large metropolitan urban areas within a region.

in industrial development will tend to be according to the "Walrasian" mechanism.

The existence of differentiated economic regions and the fact that their relative rate of industrialization does change over time can be illustrated by the experience of the United States economy. In that country six major regions have been identified; the North Atlantic seaboard, the Middle West, the South, the Great Plains, the Rocky Mountains and the Pacific Coast. Like Canada, these are primarily geographic regions, although each has its own distinctive economic structure and industrial base utilizing particular local raw materials. The heavy manufacturing concentration is in the North Atlantic seaboard largely because of a plentiful local supplies of fuel (coal) within economic proximity to iron ore (3, pp. 53-58). This region contains the largest proportion of the population (one half) although it comprises only one tenth of the nation's land area with the result that market oriented industries tend to locate there.¹³ It is a noteworthy feature of the interregional development of industry in the United States that during the present century, industry has grown or declined in different regions at vastly different rates. Furthermore, this differential rate of industrial development has occurred within different sections of the same region. This phenomenon is shown in Chart 1 below which indicates the relative direction of industrial growth in the five main sections of the Atlantic seaboard and Middle West regions.

¹³ In this respect the similarity between the regional industrial location in the United States and Canada is noted. The apparent differences are largely a result of the proportional differences in the size of the two economies.

Chart I
Industrial Development in the
Eastern United States



SOURCE: (39, pp. 155-157)

Within the context of the changing proportion of industrial output derived from a particular region it is useful to re-examine the changing locational emphasis of food. As was indicated earlier, the industrial revolution changed the medieval food-oriented industrial structure into a nineteenth century coal oriented one. There are some writers, however, who claim that during the nineteenth century the obvious importance of proximate concentrations of coal and iron tended to disguise a continued critical relationship between agriculture and industry, in part because industrial

14. See this Chapter pp. 65 & 66.

15. For a discussion of the views of such writers see (24, p. 177) and (27).

areas happened to have easy access to better than average supplies of food. These same writers claim that food resources are even more important to a region in the twentieth century as many raw materials in semi-processed form are highly mobile. On the other hand it is claimed that food is bulky and is not susceptible to initial processing by which its weight is reduced to nearly the same extent that raw materials are; most of its weight is "lost" only on consumption. However, it is submitted that the relative importance of the proximity of food to industrial development is changing at present. The technological improvements made in food processing during the past two decades and the even more dramatic improvements which appear to be on the horizon are and will continue to make food more susceptible to weight and volume losing initial processing. This in turn will allow for greater interregional specialization and trade in a host of processed and prepared food products.

The foregoing it is believed supports Dales' contention that at the present time in North America the interregional adjustments to differences in industrial development will be "Walrasian" in nature and result in regional industrial structures of different types with different industries being predominant. This can be illustrated further by the effect of changes in the locational attraction of factors of production on interregional development. Let us use the example of electricity or energy which is so important in the industrial development of Central Canada. There are two aspects to the role of energy. The conventional treatment of the economic history of the industrial revolution emphasizes the strong geographic correlation between power resources and industry. Locational analysis, on the other hand, while emphasizing power costs consider them a smaller

portion of the total cost of operating modern industry. Consequently, power resources are claimed to be relatively unimportant in determining the location of industry, except for a few large power using industries. Part of the answer to this anomalous view of the importance of energy is that the first concept refers to the location of industrial structures between regions, the second to the location of a particular industry between different sites within the same region. The second concept is also a measure of locational attraction as the ratio of the cost of a factor of production to total costs which can be misleading in the case of regional analysis (24, p. 191).

From the point of view of regional or interregional development, the locational attraction of a factor of production must be considered as an inverse function of the difficulty of moving that factor between regions. That is, the locational attraction of a factor of production is properly measured by the weight of that factor required in production divided by some index of its geographic mobility. To be more explicit, the locational attraction of X is the weight of X involved in production (either as a factor or raw material) divided by the geographic mobility of X. Therefore, the locational attraction of any material varies directly with the amount of that material used in production and inversely with its mobility.¹⁶ Dales had to make the above described type of adjustment to location theory in order to arrive at some judgement as to the locational attraction of various factors of production between regions in Canada. In the case of electricity he concluded that this was large because of the amount of electricity which is used in production

¹⁶ Mobility can be defined as transportability; which is determined not only by the cost of transporting a material or product but also by the effect of its bulk, perishability, value and the type of carrier or carriers which must be used.

in Canada. As indicated, it explains in part the differential development of industry in the provinces of Ontario and Quebec because of the limitations imposed on the interprovincial mobility of electricity by the governments of Ontario and Quebec (24, pp. 191-192).

It will by now be appreciated that the mobility of raw materials and the physical factors required in production are important to regional industrial growth, and that one of the major components in such mobility is transportation, and changes in transportation inputs. If we assume that a change in transport technology moves the supply curve for transport outputs to the right, resulting in lower transportation costs, it will have both a substitution and scale effect on regional industrial location. The substitution effect will be a double one of transportation inputs for other inputs and also of utilizing more inputs in a favoured region for those in a less favoured region. This in turn will result in a progressive differentiation and selection of industries between regions with the relevant superior and inferior resources and trade routes. The scale effect will be an increase in output engendered by the cheapening of transportation inputs which will tend to transform of scattered ubiquitous pattern of industrial production into an increasingly concentrated one (46, p. 87).

Implications for the Future Development of the Prairie Economy

The foregoing examination of certain aspects of location theory in relation to regional industrial development in Canada indicates that the Central Canadian region does contain and will likely continue to contain for considerable time the only self-sustaining light industrial area in Canada. However, the examination also reveals that the parameters of

industrial location are changing with new technologies. For example, the old reliance of industrial areas on coal has changed because of new electrical energy, fuel economies (in the order of a 50% reduction for the same output in three decades), and the development of light metals and plastics which reduce the dependence on iron and coal (24, pp. 176). Changes in railway loading and hauling techniques and other modes of rapid transport also have allowed individual regions to concentrate on certain branches of production serving widespread markets in other regions. Because of such factors regions which had no hope of industrialization as recently as fifty years ago may now have a reasonable chance of developing at least certain specific types of manufacturing activity other than that to serve internal needs.

What are the consequences for the Prairie Region? It indicates that it is unlikely the region will develop a fully integrated self-sustaining industrial economy in the foreseeable future. However, based on new technological developments, the "Walrasian" mechanism of industrial adjustment would indicate that it can develop a particular type of industrial structure as an ancillary resource processing region. Such an industrial structure would be characterized by the industrial complex rather than the broader self-sustaining industrial area, that is, by a set of activities originating at a given location all belonging to a group of activities which are subject to important production interrelations(47, p. 377). Such complexes can develop in various ways. For example, an industrial complex can consist of a group of industrial plants based on a single broad industrial process, such as the one which has developed in Alberta based on natural gas and producing chemicals of various types. Another complex

can consist of the various stages of manufacture of end products or classes of end products from a basic raw material, such as iron ore mining through pig iron and steel ingot production to the final fabrication of steel products. Finally, it can consist of the joint production of two or more commodities from a single class of raw materials such as the manufacture of food, fertilizers and industrial products from livestock. Other than oil and gas, the most abundant raw materials the Prairie Region possesses are agricultural in origin, and it is through the development of industrial complexes based on agricultural products and food processing that one would expect the most promising prospects for industrial growth to occur.

The specific types of complexes and their exact location will vary, depending on the geographic spread of the markets and the spread of the basic raw materials. For one configuration of basic products and markets all activity might be best located in one area within the region or perhaps there might be three or more complexes for the same output (47, p. 410). In any case the development of such complexes will entail a shift in the location of industry from other regions (principally Central Canada) or perhaps a shift in the location of industry within the region itself. This will not normally involve a physical movement of industry but rather will occur gradually as a differential in the rate of growth of such industries on the prairies as against the rate of growth of the same industry in other regions. The actual relocation of firms plays a small role in such an interregional shift of industry and the migration of labour is usually small or non-existent.¹⁷

¹⁷ (39, p. 151) - One technique for measuring the degree of interregional shift in an industry is to measure the difference between the change in the number and distribution of wage jobs which actually occur in a given industry in a given region and that change which would have resulted if this industry had grown or declined in the region at the same rate it did in the entire nation.

The prospects for the development of industrial complexes in the Prairie Region based on processing of agricultural products and their possible effects on the prairie economy form the subject matter of the last two chapters. We shall first examine the outlook for the traditional staple agricultural products of the prairies, the ramifications of technological changes on prairie agriculture and their significance to the overall prairie economy and the possible contribution of food processing industries.

CHAPTER III
PROCESSING AGRICULTURAL PRODUCTS
AND THE PRAIRIE ECONOMY

Outlook for Traditional Agricultural Products

Regardless of the nature and extent of the economic changes which occur in the Prairie Regional economy during the coming few decades, the staple products produced by its agricultural sector cannot be expected to change drastically. Wheat, coarse grains and livestock are the present principal farm commodities and they will remain so although the stimulus of demand and new technological factors may force some change in the relative proportion of the production of these staples. The market forces which will influence the demand for prairie agricultural products are the traditional domestic and export markets for grain and livestock and the changing pattern of food consumption as made effective through the demands of the food processing industry. We will first examine the future outlook for the traditional domestic and export markets for grain and livestock.

A number of forecasts of prairie agricultural output have been made recently by experts in particular fields, consequently there has been no attempt to make a new one here for any of the agricultural products considered. A survey was made of the more comprehensive forecasts which have been completed within the past few years. Two forecasts appear most suitable; the study entitled "Progress and Prospects of Canadian Agriculture" prepared by Drummond and Mackenzie for the Royal Commission on Canada's Economic Prospects (28) and the projections included in Caves and Holton's study of the Canadian Economy. (19) The projections in both of these studies are within the same ranges, both take into account the same type of data and both use approximately the same techniques. However, the estimates prepared by Caves and Holton were used and the discussion which follows is based on their analysis as they appear to be more consistent with the general regional approach taken in this paper.

The most important single crop of prairie agriculture is wheat.¹ In any forecast of the future prospects for agriculture in that region, wheat, therefore, must be considered first, particularly as the production of other crops historically has tended to be a function of their return to the farmer relative to that of wheat. As far as the domestic market is concerned, the per capita consumption of wheat has been declining since the second world war.² There is every indication that it will continue to decline at the rate of about one half of one percent per year or as much as 10.6% between 1955 and 1977. If this is applied to the anticipated population increase in Canada, the total consumption of wheat will have increased some 25% between 1955 and 1970 or from 52,000,000 to 65,000,000 bushels. During the same period the wheat used for animal feed will have increased from 67,000,000 bushels to about 98,000,000 bushels, resulting in a total domestic disappearance of wheat in 1970 of 163,000,000 bushels, some 44,000,000 bushels more than during the middle of the last decade. The export prospects for Canadian wheat were not particularly encouraging when the forecasts were made upon which this discussion is based, and they have not improved during the interim. Consequently, the best that can be hoped for export sales of wheat is that Canada will continue to hold the share of the European market for wheat which was held during the middle of the last decade but will hold only about two thirds of the non-European market held during the first half of that decade (because of two very good years in this period). This will mean that export sales of wheat will rise marginally to 311,000,000 bushels by 1970. The combined domestic and export market for wheat and the growth expected by 1970 is shown in Table VIII.

1 See introduction, pp. 10-16.

2 The base period used for this discussion of prairie agriculture is the early and mid period of the last decade. The reason for choosing this period is that, in the opinion of the writer, the first time during the post-war period that prairie agriculture was operating under "normal" peacetime conditions. The material and supply shortages the farmer faced after the war had been filled and markets were largely free of regulations and controls.

TABLE VIII

PROSPECTS FOR THE MARKETING
OF CANADIAN WHEAT
(Bushels)

	<u>Annual Average 1950-51 to 1954-55</u>	<u>Annual Average 1970</u>
Domestic Disappearance	119,000,000	163,000,000
Export Sales	298,000,000	311,000,000
Total	<u>417,000,000</u>	<u>474,000,000</u>

Source: (19, p. 449)

The other major prairie grain crops are coarse grains and hay which are primarily used domestically as animal feeds. The market for coarse grains will continue to be domestic and can be forecast primarily as a function of livestock requirements less an allowance of about ten percent for increased efficiency. On this basis the market for oats will increase from an annual average of 315 million bushels during the period 1953 to 1955 to an annual average of 389 million bushels in 1970. On the same basis the market for barley will increase from 114 million bushels to 158 million bushels; corn from 28 million bushels to 38 million bushels; and tame hay from 19.7 million tons to 26 million tons. The markets for rye and flaxseed will both remain at about their present level of 4 to 5 million bushels each.³ In summary, the total market for all types of cereal grains in Canada will only increase by about 21.5% between 1955 and 1970. Even though the Prairie

Region's share of the total Canadian Production of cereals will increase

3 (19, pp. 436-438) The anticipated domestic requirements for coarse grain for food and industrial uses in 1970 compared with actual use in 1955 (in brackets) is: oats 7 million bushels (5 million); barley 300,000 bushels (200,000); rye 400,000 bushels (300,000). This projection was made on the basis of increased population at constant per capita rates.

somewhat during this period, nevertheless, the traditional markets for prairie grains can only be expected to increase by about ten percent between now and 1970.

The prospects for livestock production in the Prairie Region are almost entirely a function of the total increase in demand in Canada and the extent of any shift in production from Central Canada to the Prairies. The export market is not now and is not expected to become a factor in the Canadian livestock picture. In fact, in recent years Canada has been a net importer of beef and has exported less than ten percent of total pork produced. The chances of expanding the European market for Canadian meat are poor and the United States market cannot be counted on, particularly with the likelihood that farmers in that country within a few years will be able to match the present Canadian product advantage in lean hogs (19, pp. 450-451). The production of livestock, therefore, will depend upon the growth of domestic population and per capita consumption.

In the case of beef, the factors that must be taken into account are the income elasticity for beef; the increase in per capita income; the increase in per capita consumption; and the increase in population. All of these factors must be applied to a trend line of beef production and consumption which must be determined by an examination of the traditional cycle of beef production. This cycle is normally of about ten years duration. The last cycle peaked out in 1956 when beef numbers were the highest in the post-war period and farm prices were down to \$16 and \$17 per hundredweight. Present indications are that this situation may shortly

occur again, and 1965 or 1966 could be the peak of the present cycle. This will mean that 1970 would be close to the bottom of the cycle. In 1955 the consumption of beef and veal was about 81 pounds per capita but on an actual trend basis should have been closer to 66 pounds. Combining this with the effect of the factors discussed above results in a forecast increase in the aggregate demand for beef and veal of 55% above the 1955 trend volume by 1970. In the case of pork the same type of procedure results in an increase in aggregate demand of about 50% between 1955 and 1970. Similarly, the domestic demand for poultry is expected to increase by about 58% during the same period (19, pp. 438-440). The results of these separate forecasts are summarized in Table IX below. It can be seen that, even on the basis of the conservative estimate resulting from the assumption that 1970 will be the trough of the beef cycle, the demand for Canadian livestock will increase by more than 40% between 1955 and 1970, almost double the potential for increasing grain markets.

TABLE IX

CONSUMPTION OF LIVESTOCK, CANADA,
HISTORICAL AND PROJECTED
(Millions of Pounds)

	<u>Historical</u>				<u>Projected</u>
	<u>1935-39 Avge.</u>	<u>1953</u>	<u>1955</u>	<u>1958</u>	<u>1970</u>
Beef and Veal	721	1076	1260	1256	1600
Pork	440	813	904	882	1356
Poultry	<u>194</u>	<u>389</u>	<u>432</u>	<u>450</u>	<u>683</u>
Total	<u>1355</u>	<u>2278</u>	<u>2596</u>	<u>2588</u>	<u>3639</u>

Source: Historical data, (14) and (9), projections (19, p. 440).

An important factor in the growing livestock market from the point of view of prairie agriculture is a possible shift in livestock production from Central Canada to the Prairie Region during the coming decades. Caves and Holton have estimated the extent of the shift which they consider possible, and their findings are summarized in Table X. The reason for the shift, particularly in the case of cattle and hogs, is that more than half of the prairies are well suited to livestock production and this combined with technological changes in raising livestock and meat packing, plus the growing competition for land for industrial purposes in Central Canada will tend to shift production economies to the prairies. The entire process will be strengthened by other factors within the Prairie Region itself such as the need to diversify agriculture and to add to the income of grain farmers and to provide greater employment for the farm family labour supply.

TABLE X

POTENTIAL SHIFT IN THE PROPORTION
OF CANADIAN LIVESTOCK PRODUCED IN THE PRAIRIES

	<u>1955</u>	<u>1970</u>
Cattle	59%	66%
Hogs	4.6%	55% ⁴
Poultry & Eggs	33% poultry 28% eggs	33% poultry 28% eggs
Milk	22%	25%

Source: (19, p. 463)

⁴ Based on the assumption that feed freight assistance to eastern Canada will be reduced to 60% of its present value.

However, the total potential increase in the market for prairie livestock resulting from the absolute increase in Canadian demand and the shift in production from Central Canada cannot be met by prairie farmers without basic adjustments in their techniques of farming. Admittedly, livestock enterprises can be added to grain farms with little or no additional labour force, since most of the extra work required is done at times when labour is otherwise under-employed. It is also significant that when livestock is added to an agricultural area the output of grain for feed is increased and, as the grain is in effect put through a second production process, the output of the farm is increased without adding any new land. Nevertheless, absolute farm size and expanding livestock production are interrelated. For example, in Saskatchewan many of the farmers presently raising and feeding livestock have too few acres and too few cattle to mechanize efficiently.⁵ Therefore, in the area of livestock as in grain, market and technological factors will continue to tend to bring about farm consolidation.

A number of other changes are required in prairie agriculture before livestock production can be increased significantly. Some of these are of a shorter term nature and can be accomplished relatively quickly, others are more basic to the essential economic structure of the region and will take much more time. The short term changes consist primarily of altering present practices such as taking some of the more arid soils of Alberta and southwest Saskatchewan out of grain farming and into grass for grazing. Another is the more intensive use

⁵ Source: Saskatchewan, Royal Commission on Agriculture and Rural Life, Report No. 7, p. 124.

of irrigated land in the brown soil zone to allow for a greater amount of finishing of beef along with increases in fodder and specialty crops or the extension of the supplementary feeding of cattle and hogs on the larger wheat farms of the black soil zone. These types of changes are relatively simple and are already underway. The ultimate shift to livestock, however, implies much more basic changes such as a reduction of summer fallow practices, increased intensity of land use, the widespread extension of irrigation to stabilize fodder supply and a shift in crops from wheat to grain. These latter changes are much farther in the future and will probably only occur in response to visible shifts in the relative prices of grain and livestock (28, pp. 268-272).

Another factor which will influence the trend to livestock production in the Prairie Region is the future of the feed freight assistance program. Prior to the institution of the program nearly one half of all of Canada's hogs were raised on the prairies. This proportion in some recent years has fallen as low as one third. Although the western farmers tend to resist raising livestock when wheat prices are high and their incomes satisfactory, the region has a clear advantage in livestock production and it is considered that reduction or removal of the feed freight assistance would noticeably shift hog production back to the prairies. In terms of the national economy it would seem best in the long run to feed livestock on the farms where the grain is produced and ship the dressed meat to the large markets in Central Canada (19, p. 460).

The above described policies and problems, however, will only serve to influence the time it will take for livestock production to move to the prairies. As Daly points out, regardless of such problems and

policies, pressure on eastern Canadian farm resources, including opportunities for non-farm employment, will tend to shift a larger proportion of livestock to the prairies (19, p.462). Drummond and Mackenzie support this view by pointing out that the domestic demand for meats is likely to require a level of meat production by 1980 over twice that of the average of the 1951-1955 period. Most of the increase must come from the Prairie Provinces (28, p. 268).

Future Canadian Demand for Food Products

The discussion in the previous section indicates that in the future the Canadian market, to an increasing degree, is going to replace export markets as the major outlets for prairie agricultural staples. This in turn will require a change in the staple itself from wheat to livestock, coarse grains and fodder. It will also have other ramifications such as presenting an opportunity to do far more food processing within the Prairie Region than heretofore to serve the growing domestic demand for processed food products.

In the future, food consumption and more particularly the type of food consumed will be a function of per capita income and population. It is assumed that the per capita disposable income in Canada will increase to about \$1,625 by 1970 compared to \$1,170 in 1955 or by about 39% (19, p. 433). It has been found in the United States that per capita food consumption, excluding marketing services, rises about 0.2% for each 1% increase in disposable income. If this factor were applied to the forecast growth in Canadian disposable income it results in a 7.8% increase in per capita food consumption between 1955 and 1970 or about half of one percent per year (68, p. 63.).

What does this mean to the food processing and agricultural industries? Studies of the relationship between consumer expenditures at the retail level and the sale of farm products indicate that the income elasticity for farm products at the retail level varies from a high of 0.80 in the case of beef and veal to a low of -0.15 in the case of wheat as shown in Table XI. The weighted average elasticity for all the products shown in the table is 0.32 and if the omitted foods are added, such as fresh fruits and vegetables and canned and frozen foods, each with an income elasticity well above 0.50, the income elasticity for all farm products at the retail level is about 0.50. The combined effect of the income elasticity of the demand for food and the relationship between the retail demand and farm demand will result in the 39% increase in personal disposable income anticipated between 1955 and 1970 causing an 8% increase in the per capita demand for farm products. In conjunction with the 34% increase in population expected during the same period this will result in a 45% increase in the total domestic demand for farm products (19, pp. 434-435). The nature of the income elasticities shown in Table XI indicates that a good portion of this increase will take the form of a shift to the more expensive foods such as meats, dairy products, eggs, fruits and vegetables and away from cereals and potatoes.

TABLE XI
INCOME ELASTICITY FOR FARM PRODUCTS
AT THE RETAIL LEVEL IN CANADA

Beef and Veal	0.80	Cheese	0.59
Pork	0.60	Fluid Milk	0.25
Poultry	0.84	Butter	- 0.14
Eggs	0.35	Wheat	- 0.15

SOURCE: (19, p. 435)

The increased demand for food production in Canada and the changing nature of this demand will have a profound effect on the food and beverage industry throughout the country. This industry is still the largest in the country, accounting for 16% of total manufacturing income. During the coming decade it is anticipated that it will expand more rapidly than the Gross National Product as a result of an anticipated up-grading of consumer food purchases and consequent increase in the demand for more highly processed foods. Total output is expected to reach \$6,500,000,000 to \$7,000,000,000 by 1970 (based on the past correlation of 90% with personal disposable income) in increase of 66% over the current output of \$4,200,000,000. It is not anticipated that either exports or imports will be a factor in the growth of the industry since they both are and will remain approximately equal at about 8% of domestic requirements and for the most part consist of specialty products with little potential for significant increase (19, pp. 573-574).

The expanding and more complex food processing industry is developing in Canada at a time when the locational pull between food and industry is weakening, i.e. at a time when it is becoming less essential for the food growing areas and food processing industries to be located close to or in the same regions as the major industrial areas with their large concentrated consumer markets. As noted earlier, originally agriculture was the base to which the structure of society was oriented. The agricultural sector of the economy provided the markets for the industrial products, provided many of the industrial raw materials, provided the labour for the factories, and perhaps of most importance provided food and drink for the workers (which fre-

quently exceeded the weight of the raw materials used by the worker combined with the weight of the finished product he manufactured). Under these conditions it was economically essential that the growing of the agricultural products and other processing be situated as close to the site of industrial activity as possible. It was only in the case of agricultural products that were highly transportable, storageable and did not lose much weight in processing, such as wheat, that production could be distant from the major areas of consumption. With the increased productivity of labour and the use of new technologies, this is changing and the industrial areas are becoming emancipated from the ties of agriculture. In Walter Isard's words:

As the labourer works up greater quantities of raw materials which yield larger amounts of finished products, while simultaneously his consumption of food and drink at most rises at a considerably smaller rate, the pull of the agricultural stratum is attenuated and at times loses its dominance. Relocation (of industrial structures) at sites of mineral reserves and at new nodes takes place. Industry severs its geographic bonds to agriculture. (46, p. 7)

The relevance of the above described trends of development are obvious. By adapting itself to supplying the new demands of the growing domestic Canadian market for foodstuffs the traditional prairie agricultural sector can diversify away from its heavy reliance on wheat for the uncertain export markets. In doing so more intensive use can be made of the existing land with resulting higher income and employment per acre. In addition, this diversification would supply increased amounts of new "staple" raw materials which could serve as the basis for a substantial food processing industrial complex situated within the Prairie Region supplying the needs of the Central Canadian industrial region.

Concept of Agribusiness and Its Relevance

Speaking to an agricultural gathering in the United States a few years ago an industrialist made the following comment:

The agricultural world and the industrial world are not two separate economies having merely a buyer-seller relationship. Rather, they are so intertwined and inseparably bound together that one must think of them jointly if there is to be any sound thinking about either one or the other.⁵

The industrial world referred to was the food processing industry and the agricultural supplies and equipment industry. In other words, the speaker was advocating that agriculture and the industry which supplies its needs plus the industry which processes the products it produces are all essentially one unit. This was perhaps true at one time. For example, as recently as 150 years ago the typical farm family not only raised crops and livestock but their own draft animals. They made their own tools and equipment, fertilizer and other production items. They processed their own food and fibre and sold locally most of the excess. In this way virtually all the operations associated with agriculture were functions of the farm. However, farming is vastly different today. It is becoming more and more a commercial operation and the farmer is becoming a specialist who confines his activities to the growing of a few basic crops or livestock which are sold to feed the 88% of the Canadian population employed off the farms. The function of storing, processing and distributing food has been transferred to specialists in these activities who in turn have erected complex transportation and food processing industries. The functions of supplying the materials and equipment required by the farmer have also been transferred to specialists who have developed highly complex chemical and

5 T.V. Hansen, Chairman of the Board, Sears, Roebuck & Co., address given to the National Institute of Animal Agriculture, Conference, April 15, 1955.

agricultural equipment industries often far removed from the agricultural scene. These off farm agriculturally related forms of activity today in North America have increased to the point where they are of greater magnitude than agriculture itself.

Two Americans, John Davis and Ray Goldberg, have studied the development and ramifications on the economy of this phenomenon of the splitting up of what once was the sum of agricultural activity. They have termed it "agribusiness" which they define as: "The sum of all operations involved in the manufacture and distribution of farm supplies; production operations on the farm; and the storage, processing and distribution of farm commodities and items made from them." (26, pp. 1-2) In other words, the sum of activity which comprised agriculture 150 years ago. They go on to point out that what has occurred has been a gradual dispersion of function from agriculture to business. In no sense is it the result of a preconceived plan or design. Rather it is the product of a complex of evolutionary forces more or less spontaneously at work without central guidance or direction. In fact, so gradual has been the development of agribusiness that its significance has been largely unrecognized. Nevertheless, it is significant particularly for the economy of the Prairie Region where agriculture itself is not only undergoing a transition but the relationship of agriculture to food processing is undergoing changes which can be very important to the economy of the region.

The causes of the growth of agribusiness are largely technological. The technological changes on the farm started in the eighteenth century with the development of the cast iron plow. However, real momentum was not gained until 1830 when Lane, Deere and Parlin developed the steel mould board plow, and McCormick, Manning and Hussey mowers and

reapers. These improvements tended to become vehicles for self-perpetuating change as each created bottlenecks elsewhere in the agricultural process and so fostered more change. The most dramatic change occurred in the twentieth century with the introduction of internal combustion engines which not only released land for raising cash crops but allowed the use of more powerful field equipment such as harvesters, large cultivators, and hydraulic loaders. An equally important although less dramatic development has been the growth of research, plant and animal breeding, soil conditioning, water control, etc. All of these not only vastly improved the output of agriculture, but also raised the productivity per man to extents never dreamed possible and increased the economic rewards to farmers of specializing in a few forms of activity.

The technical changes on the farm meant that agriculture required a decreasing proportion of the total labour force (for example in Canada in 1939, 30% of the labour force was on farms, in 1949-24%, and in 1959-12%). The growth of the food processing industry has been related to the necessity to feed these non-agricultural workers, but today has grown to the point where it even processes the food that farmers use. In the main, the development of this industry took the form of a technological revolution in the handling, preserving and distribution of food. It started with the commercial adaptation of preserving and at present is being transformed by the use of new techniques of dehydrating, concentrating, quick-freezing and pre-cooking. New techniques of transport, refrigeration, grading, packing and storing are further changing the character of the industry. Similarly, on the supply side, the use by the farmer of complex machinery, elect-

ricity, specially prepared fertilizers and feeds, etc., have grown to the point where today the farmer purchases roughly one half of all his requirements.

The total concept of agribusiness, as indicated above, consists of three fairly distinct sectors or aggregates, farm supplies, farming, and processing-distribution. These three together can be called the "agribusiness triaggregate". It has not been possible to construct a statistical picture of the position of the triaggregate in the Canadian economy. However, an analysis has been made of the position of the triaggregate in the United States economy which is summarized below. The many parallels between the economic structures of the two countries will allow the reader to gain a general conception of the relevant situation in Canada.⁶

In total the agribusiness triaggregate is a major component of the United States economy comprising between 35% to 50% of total national economic activity, depending upon the technique of measurement. The extent of consumer purchases of agribusiness items in the United States in 1954 was about 40% of total consumer purchases as shown in Table XII. It can be seen that they are declining slowly on a proportionate basis although increasing absolutely. It is interesting to note that in Canada in 1954 the proportion of consumer purchases of the same items was slightly higher - 44%, and have subsequently declined to a current level of 43% (13). The agribusiness labour force in the United States in recent years has remained consistently about three percentile points behind the proportion of consumer expenditures on agribusiness products, declining from 41% of the total civilian labour force in 1947 to 37% in

⁶ The following discussion is based on Davis and Goldberg (26).

1954. The data available in Canada indicates that the proportion of total employment in agribusiness sectors is slightly higher than in the United States although within the same range.

TABLE XIII
CONSUMER PURCHASERS OF AGRIBUSINESS ITEMS,
UNITED STATES, BILLIONS OF DOLLARS AND PROPORTION
OF TOTAL CONSUMER EXPENDITURES

	1947		1954	
	Purchases (Billions\$)	Proportion of Expenditures	Purchases (Billions\$)	Proportion of Expenditures
Food	\$ 38.7	23.4%	\$ 55.4	23.4%
Meals	<u>11.9</u>	<u>7.2</u>	<u>14.4</u>	<u>6.1</u>
Sub-Total	50.6	30.6	69.8	29.5
Tobacco Products	3.9	2.3	5.3	2.2
Shoes and Footwear	3.0	1.8	3.5	1.5
Clothing and Accessories	<u>15.6</u>	<u>9.5</u>	<u>16.0</u>	<u>6.8</u>
Sub-Total	22.5	13.6	24.8	10.5
<u>TOTAL</u>	<u>\$ 73.1</u>	<u>44.2%</u>	<u>\$ 94.6</u>	<u>40.0%</u>

SOURCE: (26, p. 8)

The relative importance of the separate segments of the agribusiness triaggregate can be illustrated by the relative employment in each and the changes in employment during the post-war era as shown in Table XIII. It is interesting to note the declining importance of the agricultural segment and the growing importance of the supply and processing segments. These latter two segments together accounted for 77% of total employment in 1954 compared with only 59.2% five years earlier. This change is undoubtedly due to the influence of a number of factors, but in part it is considered that it reflects the extent to which the

current wave of technological innovations are increasing farm productivity and are continuing to restrict the proportion of agriculturally related activities which are being performed by the farmer himself.

TABLE XIII

EMPLOYMENT IN THE AGRIBUSINESS TRIAGGREGATE, UNITED STATES			
	<u>1947</u>	<u>1954</u>	<u>Percent Change</u>
<u>Number of Workers (Millions)</u>			
Farm Supplies	5.0	6.0	+20%
Farming	10.0	8.0	-20%
Processing-Distribution	<u>9.5</u>	<u>10.0</u>	+ 5%
Total	<u>24.5</u>	<u>24.0</u>	- 2%
<u>Proportion of Total Agribusiness</u>			
Farm Supplies	20.4%	25.0%	
Farming	40.8	33.0	
Processing-Distribution	<u>38.8</u>	<u>41.7</u>	
Total	<u>100.0%</u>	<u>100.0%</u>	

SOURCE: (26, p.14)

An examination of the changes in the relative value of the output of the three sectors of the triaggregate during the course of this century is far more revealing in showing the decline in the share of total agriculturally related activities which are being performed by the agricultural sector of the economy itself. The extent of this trend away from the agricultural sector to the other two sectors can be seen from the data presented in Table XIV. Column one of this table shows the gross value of the output of each agribusiness sector and an examination of it reveals that in 1910 about 37% of the gross output of all three sectors was accounted for by farming, whereas by 1954 this share had declined to 24%. However, the true relative importance of each sector

in meeting the final demand for the range of agribusiness products is shown by the data in columns two and three. Column two shows the net value of output of each sector, i.e. the actual contribution each made to total agribusiness output. For example in 1910 the farming supply sector provided the farming sector with one billion dollars worth of equipment, fertilizer, seed, etc. In turn the farming sector using these materials produced a total output valued at \$5.8 billion, i.e. they added \$4.8 billion to the value of the materials and supplies they used. Finally, the processing-distribution sector took the \$5.8 billion worth of products from the farming sector and through their function of transportation, storage, grading, canning, preserving, etc., added \$3.1 billion to its value and it was sold to the consumer for a total of \$8.9 billion. The relative importance of each sector's contribution to the total agribusiness output is shown in column three and the significant factor is the change in the proportion of the contribution during this century. In 1910 every \$100 of demand for agribusiness products resulted in the supply segment producing \$11 worth of goods, the farm segment increasing output by \$54, and the processing-distribution segment increasing output by \$35. By 1954 this had changed completely and every \$100 of demand for agribusiness products resulted in the supply segment producing \$21 worth of goods, the farm segment only \$17 worth of output and the processing-distribution sector \$62 worth. In other words, in the relatively short period from 1910 to 1954 the farm segment's contribution to the total agriculturally induced activity in the economy had decreased by almost 70%.

TABLE XIV

VALUE OF AGRIBUSINESS OUTPUT
 UNITED STATES, 1910-1947-1954.
 (Billions of Dollars)

	<u>Gross Output</u>	<u>Increased Value</u>	<u>Percent of Increased Value</u>
	(1)	(2)	(3)
<u>1910</u>			
Farm Supplies	\$ 1.0	\$ 1.0	11%
Farming	5.8	4.8	54
Processing-Distribution	8.9	<u>3.1</u>	<u>35</u>
Total	...	\$ 8.9	<u>100%</u>
<u>1947</u>			
Farm Supplies	\$12.8	\$12.8	20%
Farming	29.3	16.5	26
Processing-Distribution	62.9	<u>33.6</u>	<u>54</u>
Total	....	\$62.9	<u>100%</u>
<u>1954</u>			
Farm Supplies	\$16.4	\$16.4	21%
Farming	29.5	13.1	17
Processing- Distribution	<u>75.0</u>	<u>45.5</u>	<u>62</u>
Total	...	\$75.0	<u>100%</u>

SOURCE: (26, p.14)

The magnitude of this shift is considered important, particularly to areas such as the Prairie Region in Canada, which contain primarily the farming sector of the triaggregate, and import many of the farm supplies required from other regions while exporting most of the raw agricultural products to be processed in other regions. Furthermore, the extent of current technological developments in all three segments and the rapid decrease in agricultural employment compared with increases in employment in other segments indicates that in the future agriculture itself probably will account for an even smaller share of the total agribusiness activity. Consequently, the economics of basic agricultural regions that do not possess a good representative share of supply and processing industries will receive a smaller and smaller portion of the economic activity resulting from the consumers' demand for foods and beverages.

There is a basic problem in the adjustment of the agribusiness triaggregate to internal changes which stems from the basic difference in the organization, structure and reaction to change of the farm sector from the other sectors. In Canada, in 1956, there were 575,000 farms. Although more than half of these farms were of a marginal nature and in total produced only about one tenth of all agricultural products marketed, nevertheless, the bulk of the output was produced by over 280,000 individual farm enterprises, the majority of whom are in the Prairie Region (9). Farming tends to be a highly individualistic form of activity and is not characterized by any significant amount of vertical integration⁷ with the single exception of the assembly of grains. To quote the Royal Commission on Price Spreads:

Voluntary co-operative organizations play a very minor role in food retailing, handling only 2% of total sales. Although in some industries e.g. dairy products, and in some parts of the country e.g. Quebec, the proportion is much higher, in the country as a whole and for all food processing industries the contribution of farmers co-operatives in processing is, and has remained at, about 7%. In the assembly of farm products, however, they have a more substantial part. Co-operatives perform 36% of the assembly of commodities other than grains, and approximately 50% of the latter commodities. The proportion has not changed significantly over the period 1949-1958. (17, Vol. I, p. 11)

If one considers the entire agribusiness cycle it is doubtful if as much as 10% of farm output and requirements are handled co-opera-

⁷ Vertical integration is normally understood to refer to an organization of production under which a single business unit carries on successive stages in the processing or distribution of a product which is sold by other firms without further processing. Vertical integration results in by-passing a market or having a position on both sides of the market: making a product instead of buying it: carrying it to a later stage instead of selling it. Through vertical integration the firm by-passes, or more accurately speaking, encompasses, a market nexus. Administrative direction replaces bargaining in the market. (1, pp. 157&282)

tively. As Davis concludes, basically farming has been and still is a family enterprise, and a strong sentiment prevails for continuing this pattern. In general, well equipped family farm units thus far have demonstrated a great capacity to utilize the new technologies and continue in effective competition with larger commercial units (26,p.19).

On the other hand, the supply and processing distribution sectors of the triaggregate are similar in structure and are characterized by and dominated by a few large highly organized commercial and industrial organizations. Furthermore, these organizations have been integrating extensively in recent years both horizontally and vertically and in many instances have been expanding into functions closely related to initial activities. In other words, in these two agribusiness sectors a situation of oligopolistic competition exists and there has been a concentration of function. For example, in the United States in 1955, some 76 food and fibre companies were listed among the largest 500 corporations. Further, in that country in 1947, four firms did 41.3% of the total meat slaughtering, eight flour mills did 40.6% of the total flour grinding, and four food retailing stores did 43.5% of the food retailing business. On the supply side the same situation exists; in 1955, 13 farm supply companies were listed among the top 500 firms. In 1947, eight firms produced 27% of all prepared animal foods and eight farm equipment manufacturers produced 70% of the total dollar volume of that industry (26, p. 19). These sectors of the agribusiness triaggregate in Canada are organized on the same basis as in the United States, in many instances the Canadian firms are subsidiaries of American firms and the degree of concentration is even higher as a result of the relatively smaller size of the agribusiness sector. The degree of con-

centration in the food processing sector in Canada is shown in Table XV.

TABLE XV
CONCENTRATION IN CANADIAN FOOD AND
BEVERAGE INDUSTRY, 1948

	Proportion of Employment in <u>3 leading firms</u>	Number of Firms to Account for 80% <u>of Employment</u>
Cigarettes, Cigars, Tobacco	84.5	2.1
Distilleries	84.2	2.5
Sugar Refineries	68.3	4.1
Malt and Malt Products	66.2	3.6
Starch and Glucose	64.6	4.0
Macaroni, etc.	59.9	5.6
Tobacco Processing & Packing	58.6	9.1
Slaughtering & Meat Packing	55.3	11.2
Processed Cheese	49.2	7.4
Breweries	48.6	8.6
Biscuits and Crackers	41.7	11.1
Condensed Milk	35.6	12.0
Flour Mills	34.9	22.0
Cocoa, Confectionery, etc.	33.4	23.4
Fruit and Vegetable Preparation	32.4	72.3
Soft Drinks	30.9	149.2
Bread and Bakery Products	20.9	732.5
Butter and Cheese	19.2	369.9
Stock and Poultry Feeds	15.5	92.4
Fish Curing and Packing	14.9	132.5
Feed Mills	3.4	469.8

SOURCE: (63, p.66)

According to Davis and Goldberg, probably the most crucial and complex problem facing agriculture, as a result of the differences between it and the other agribusiness segments, ⁽¹⁵⁾ it that commonly referred to as the "cost price" squeeze. This phenomenon not only conditions the income status of the farm family, but also affects the rate of capital formation and hence the rate of progress of the farming aggregate.

"Basically the situation is the result of the inability of farm management, itself, to tailor output to market demand in the same manner as does the management of business and industrial enterprises" (26, p. 22). As a result, surpluses can continue to build up for years in the face of falling demand. In many ways this inability to tailor output is tied to the effect of weather and climate as well as research and the stimulating effect of education. However, the agricultural segment is close to the position of perfect competition in which the individual producer is unable to influence the market price, but can sell all that he does produce at the market price. It is this price and market situation combined with a relatively high fixed investment which encourages the farmer to continue production as long as his out-of-pocket expenses are met. The off farm actions of the other sectors of agribusiness, which are characterized by imperfect, monopolistic or oligopolistic competition, tend to contribute to the plight of the farmer. As noted earlier, the farm supply sector sells the farmer half of his requirements, but for reasons of profit internal to the supplying firms and not to the welfare of the farmer.⁸ Similarly, on the marketing side the buying decisions of and prices paid by the processors are determined by factors internal to processing firms and not by the needs of agriculture, furthermore the marketing is fragmented between a number of buyers and sellers up to the consumer level. In effect neither of the non-farm phases of agribusiness have developed effective counter-forces to offset the manner in which they and the agricultural segment adjust to the forces of supply and demand. Davis and

⁸ For example, there are indications that even large farmer owned co-operative feeding organizations operate in much this manner as their prime object is to encourage farmers to purchase feed and not to help the farmer analyze the results of increasing his production.

Goldberg's conclusion about this problem is that in the long run the maladjustment will tend to be resolved. However, the more perfectly competitive structure of the agricultural segment relative to the imperfectly competitive structure of the other two segments, will result in such adjustments coming slowly and with much suffering on the part of farm operators.

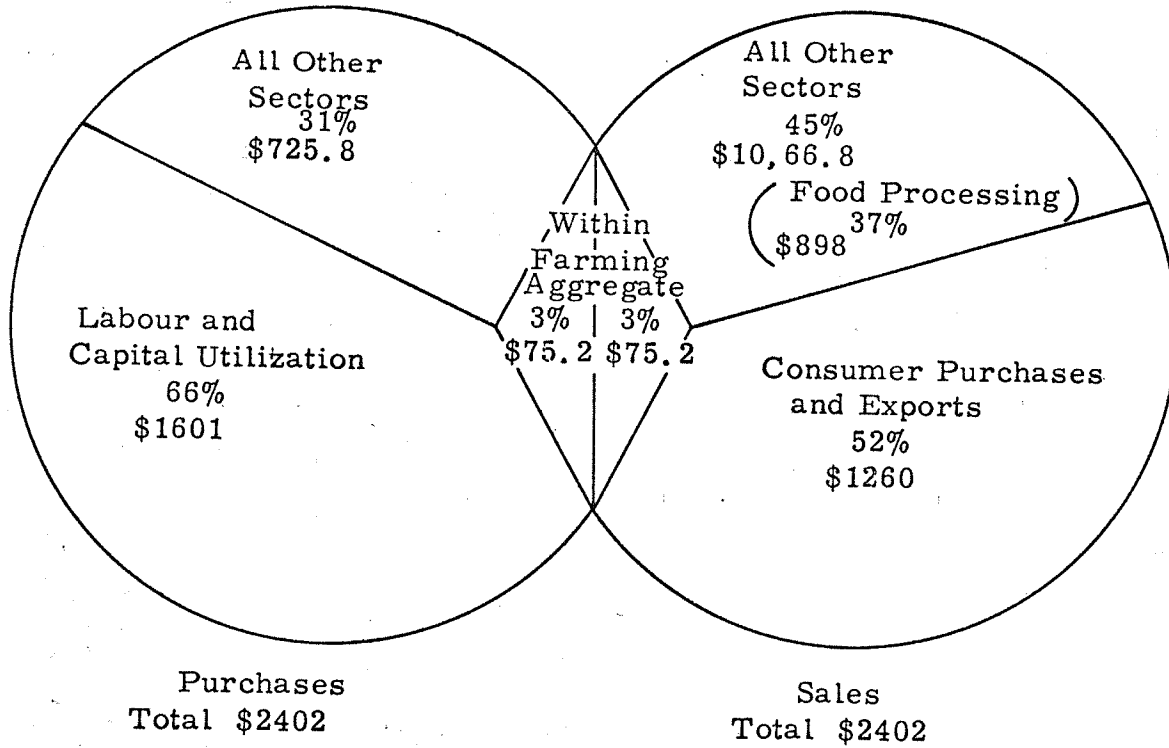
The foregoing discussion has been based primarily on experience in the United States although it is considered that the situation is approximately the same in Canada as the specific references to Canadian experience indicate. However, there are certain differences in the relationship of agriculture to the other sections of the economy in the two countries which are illuminating and which provide some indications of the possible trend of future relationships between agriculture and industry in Canada. Chart II shows the inter-industry relationship between agriculture and the other sectors of the national economies in Canada and the United States. The data has been drawn from inter-industry (input-output) analyses which were made of the Canadian economy in 1949 and of the American economy in 1947. As both the unit of measurement and the sources of data vary somewhat the absolute figures are not too relevant. It is the relative proportional disposition of activity that is important. The two sections of the chart have been set up in exactly the same manner with all the purchases of the agricultural sector represented on the left hand side and the sales of that sector on the right hand side. Purchases consist of: those from within the aggregate, i.e. purchases from other farms such as cattle, fodder, seed, etc.; from the other sectors of the economy such as fuel, equipment machinery, fertilizer and commercial feed; and finally labour and capital stock.

Sales consist of: those within the aggregate to other farmers (the reverse of the purchases within the aggregate); those to consumers without processing such as fresh vegetables and fresh fruits as well as all sales in unprocessed form in export markets (primarily grains and livestock); and finally to all other sectors of the economy (primarily manufacturing industries) for processing.

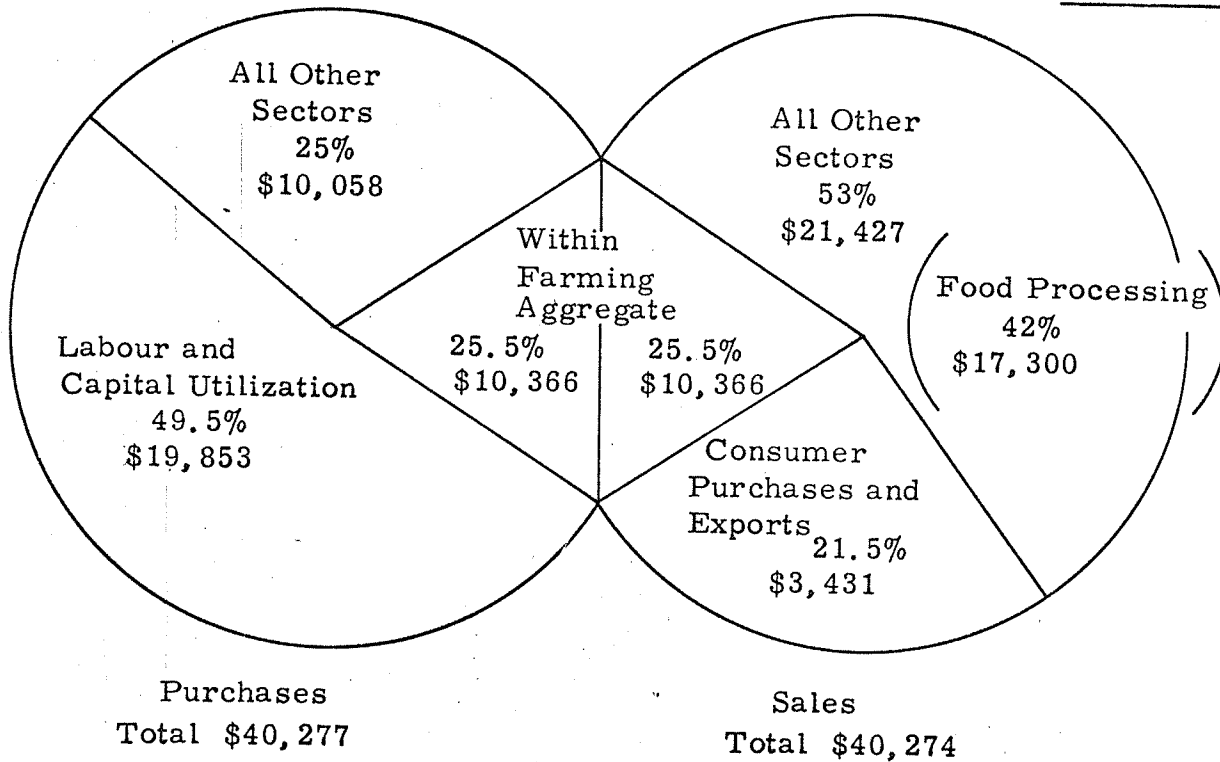
A number of significant differences in the makeup of agriculture and its role in the economies of the two countries are suggested by the data presented. It would appear that there is much less direct transferring of production commodities such as seed, fertilizer, fodder and livestock between farmers in Canada than in the United States, as transfers within the agricultural aggregate in the former country only account for 3% of total sales and purchases compared to 25.5% in the latter country. Further, the higher purchases from "all other sectors" in Canada in conjunction with the relatively greater use of labour and capital would indicate that far more of the commodities mentioned above that are transferred within agriculture in the United States, enter the market in Canada, are processed in some degree, and are then sold back to agriculture. The most obvious differences, however, show up on the sales side. The data here reveals the proportionately greater importance of export markets for Canadian agriculture and the relatively smaller proportionate importance of food processing industry utilization of agricultural products compared with the United States. In some respects, one would expect that, as the domestic market for agricultural products in Canada becomes more important relative to the export market, as the processing industry develops, and as the Prairie Region develops a more diversified

Chart II
 Characteristics of Agriculture Inter-Industry
 Relationships in Canada (1949) and the
 United States (1947)
 (Millions of Dollars)

Canada



United States



Source: Canadian data - (12, Table I), United-States data - (26, p. 32).

agricultural base, the inter-industry relationships of Canadian agriculture will to an ever greater extent come closer to the configuration of the agricultural industry in the United States at present.

It is considered that a clearer picture of the relationship between the agricultural and processing-distribution sectors of the agribusiness triaggregate in Canada can be obtained by a closer examination of the phenomenon of "price spreads" in Canada. The only recent study of this subject in Canada was prepared by the "Royal Commission on Price Spreads of Food Products" whose report was issued in 1960. The study of this commission ignored the subject of the effect of the supply requirements of agriculture, except for a few casual references, and concentrated on the relationship between agricultural, processing and distribution and the consumer. In this context the commissioners defined price spreads as follows:

The spread is related to what happens between the farmer and the consumer, that is, in the food marketing system, but it is affected also by factors outside the marketing system - factors affecting consumer demand and factors affecting the supply of agricultural products. During the period under consideration (1949-58) increasing consumer incomes and demand have been operating in the direction of pulling prices up; increased production capacity on farms and consequent pressure of agricultural supplies have been tending to pull prices down. (17, Vol.I,p.9)

The commission recognized that the general share of the consumer dollar which the farm sector receives usually indicates the extent of marketing services (such as storage, processing, packaging and transportation) attached to the commodity after it leaves the farmers' hands. The investigations carried out by the commission indicate that only in the case of butter and eggs has the farm share normally exceeded 70% of the retail equivalent value. At the other extreme, in the case of

bread and frozen peas, it is normally less than 20%. From this low, the farm share rises gradually as the extent of the processing of the products becomes less. It is about 20% for canned tomatoes, corn and peas; 28% to 34% on frozen strawberries, apples and processed cheese; 40% to 46% on evaporated milk, flour and sugar beets; and 60% to 62% on chicken broilers, pork and beef (17, Vol. I, p. 17). The commissioners then went on to calculate the total price spread between the value of cash receipts of Canadian farmers and the total consumer expenditure on food of domestic origin between 1949 and 1958 in the following manner (see Table XVI and Chart III):

Of the total food supply of the Canadian people, about four-fifths comes from domestic sources. Total expenditures on food of farm origin increased by \$2,275 million between 1949 and 1958. Of this increase, \$1,846 million was spent on food of Canadian origin and \$429 million on imported food. Between 1949 and 1958, cash receipts of farms from sales of food for use in the domestic market increased by \$495 million. From 1949 to 1951, 60% of the Canadian farmers' cash receipts came from the home market; from 1955 to 1958 almost 65% came from this source. By deducting the cash receipts of Canadian farmers for the food parts of the raw materials sold by them from the total expenditures of Canadian consumers at retail on food of domestic origin we arrive at our estimate of the aggregate marketing bill (e.g. the price spread or the gross output of the processor-distributor sector of the agribusiness triaggregate). The marketing bill increased from \$900 million in 1949 to \$2,243 million in 1958; the farm value as a percent of retail value declined from 59% to 44%. (17, Vol. I, p. 14)

The commission came to much the same conclusion about the basic problem of the relationship between the farming sector and the processing-distribution sector in Canada as did Davis and Goldberg about the same problem in the United States:

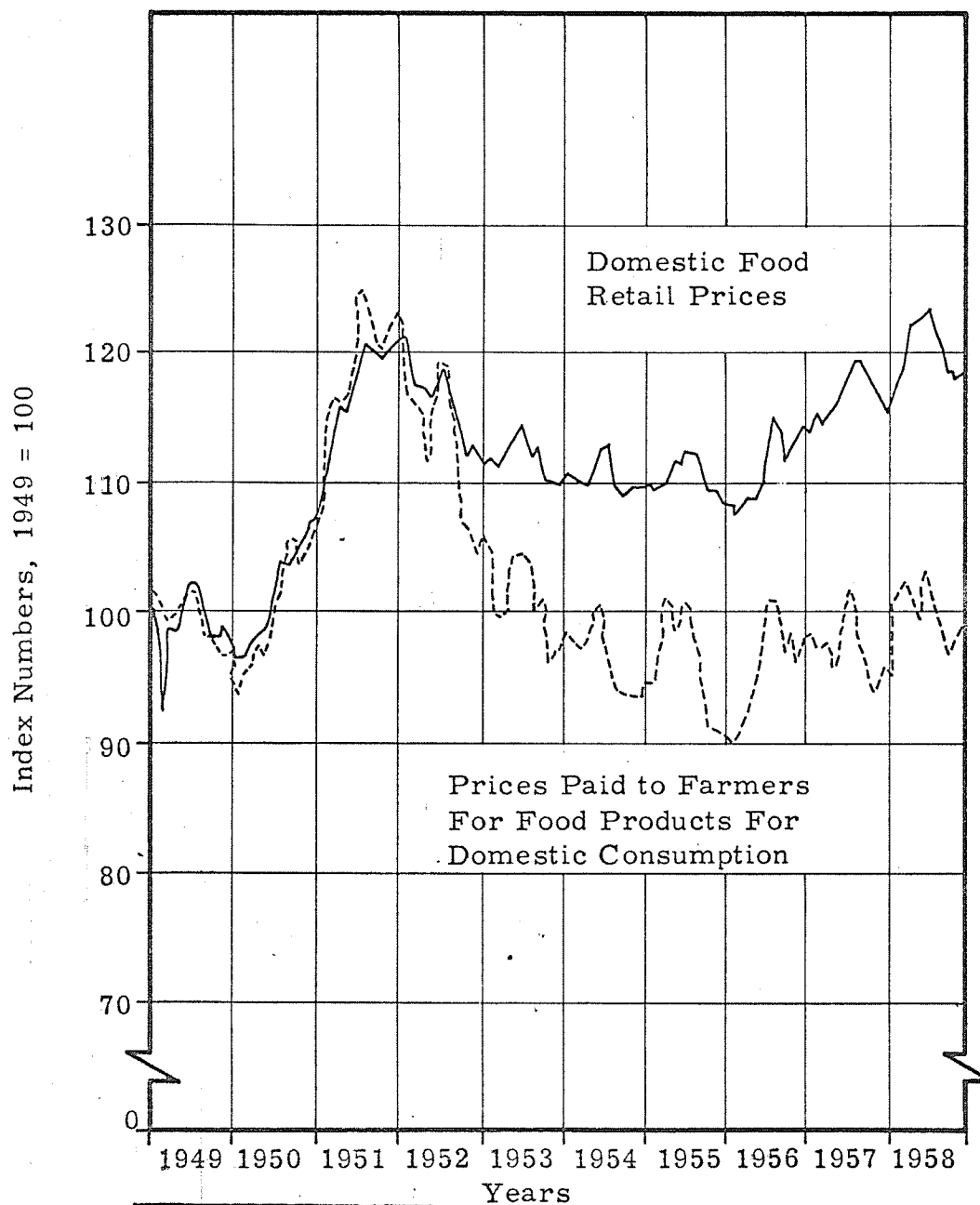
TABLE XVI
 ESTIMATED AGRICULTURAL PRODUCTS
 MARKETING BILL - CANADA 1949-1958
 (Millions of Dollars)

<u>Year</u>	<u>Total Retail Value</u> (1)	<u>Total Farm Value of Raw Material (Food & Non-Food By-Products)</u> (2)	<u>Farm Value Non-Food By Products</u> (3)	<u>Farm Value Raw Food Material Only</u> (2-3) (4)	<u>Farm-Retail Marketing Bill</u> (1-4) (5)	<u>Farm Value as a Percent of Retail Value</u> (4+1) (6)
1949	2175	1333	58	1275	900	59
1950	2297	1403	63	1340	957	58
1951	2703	1651	77	1574	1129	58
1952	2851	1557	53	1504	1347	53
1953	2952	1516	45	1471	1481	50
1954	3035	1503	43	1460	1575	48
1955	3228	1550	47	1503	1725	47
1956	3475	1644	50	1504	1881	46
1957	3799	1705	48	1667	2132	44
1958	4020	1828	51	1777	2243	44

Source: (17, Vol. I, p. 21)

Chart III
 Retail Price Index for Food Produced
 In Canada and Farm Price Index
 Based on Domestic Market Disappearance

(Constant Wrights 1949 = 100)



Source: (17, Vol. 1, P. 21)

The evidence we have studied has led us to the conclusion that there is an essential difference between the determination of prices in other markets between the farm and the consumer. The difference is related to structure. We have said that there is no practical possibility of reconstituting the food industries so as to create a structure similar to that in agriculture and indeed, the irregularity of prices and incomes in agriculture raises doubts as to whether the structure of agriculture is a desirable model. (17, Vol. I, p. 60)

The above description of the cost-price spread in Canada and the analysis of the problems of the changing relationship of the farming sector to the processor-distributing sector in Canada indicates to some extent the similarity of agribusiness in the two countries. This similarity lends a degree of support to the thesis that the diversification of agricultural production in the Prairie Region in conjunction with the expansion and location in this region of food processing industries can serve as the foundation for the growth of an industrial complex oriented to serving the needs of the Central Canadian market.

Economic Stimulus of Bakery Products and Meat Packing

The extent to which a diversification of agriculture in the Prairie Region in conjunction with the expansion of a local industrial complex based on food processing will stimulate the overall economy of the region largely depends upon two factors; the potential growth in the market for the locally processed food product, and the amount of activity within the region required to meet the needs of the basic processing industry for raw materials and services. The market for such processed foods in all probability will be the domestic Canadian market, the bulk of which is in Central Canada.

One indication of the amount of economic activity which various food processing industries generate is the relative proportion of the

output of the agricultural sector which they purchase. This information is available for the Canadian economy in the year 1949 and is presented in Table XVII. An examination of this table shows that direct consumer purchases and the export markets provide an outlet for slightly more than 55% of all raw agricultural products; the food, beverage and tobacco industries purchase about 49.5% and the remaining 5% consists of intra-agricultural transfers and sales to other industries such as chemicals and paints. Of the sales to food processing industries, it is evident that only three industries, meat products, dairy products, and grain mill products purchase products which can be readily grown in western Canada in sufficient volumes to serve as a major stimulus to the agricultural economy of the region.

TABLE XVII

SALES OF THE FARMING AGGREGATE,
CANADA, 1949 *

<u>Buyer</u>	Rank Within <u>Aggregate</u>	<u>Gross Sales</u>	
		<u>(\$Millions)</u>	<u>(% of Total)</u>
Consumer Purchases	1	745.0	31.0
Exports	2	582.0	24.2
Meat Products	3	413.4	17.2
Dairy Products	4	268.0	11.1
Grain Mill Products	5	152.4	6.3
Tobacco and Products	7	50.6	2.1
Fruit and Vegetable Products	9	24.2	1.0
Misc. Food Preparation	10	24.0	1.0
Confectionery & Sugar Refining	14	11.6	0.5
Bakery Products	15	6.6	0.3
All other Buyers	..	126.2	5.3
Total	..	2402.0	100.0

SOURCE: (12, Table I)

Of the classes of agricultural products sold to the three processing industries described above, both dairy products and grain mill products are of a nature which do not lend themselves to extensive processing before they are consumed. On the other hand, meat products must

all be extensively processed before consumption and often the product is moved through a complex chain of separate industries before it is consumed. This fact is illustrated by the data shown in Table XVIII, which although based on United States experience, is relevant to this argument. It shows that in 1947 in that country 83% of all cattle and hogs (meat animals and their products) sold by the agricultural sector were purchased by the food processing industry, compared with only 27% of all food grains and feed crops and 39% of all dairy products. Meat packing has one further advantage in a region such as that of the prairies in that there is considerable weight loss in the raw agricultural product during processing; the processed product is storable and can be transported easily. This means that the locational ties of the physical processing plant to consumer markets are relatively weak and the industry can be induced to locate in the agricultural area close to the source of raw materials.

TABLE XVIII

PROPORTION OF AGRICULTURAL OUTPUT
PURCHASED BY FOOD PROCESSING INDUSTRIES,
UNITED STATES, 1947

<u>Agricultural Product</u>	<u>Proportion of Total Output of Each Product Purchased by Food Processors</u>
Oil Bearing Crops	88%
Tobacco	88%
Meat Animals & Products	83%
Farm Dairy Products	39%
Fishing, Hunting & Trapping	34%
Food Grains & Feed Crops	27%
Vegetables & Fruits	21%
Poultry & Eggs	14%
All Other	29%

SOURCE: (26, p.41(revised))

Although the data provided in Tables XVII & XVIII gives some indication as to what food processing industry could serve as the nucleus of an industrial complex in the Prairie Region, a more complete concept of the total economic stimulus which would occur as a result of the expansion of different processing industries can only be gained from a detailed examination of the inputs required per unit of output of each processing industry. Unfortunately, an analysis of this type has not been made of Canadian processing industries. However, such an analysis of the meat packing industry and the bakery products industry in the United States has been made by Davis and Goldberg.⁹ The structure, organization, equipment and inputs of each of these industries is similar in both Canada and the United States. Consequently, the findings of the American study are considered to be relevant to the Canadian situation and a summary is presented below.

It can be seen from an examination of the data presented in Table XIX that the increased activity in the farming sector resulting from an increase of one million dollars in the output of either bakery products or meat packing is \$279,000 and \$1,334,000 respectively. This means that an increase in meat packing output has more than four times the stimulating effect on agricultural activity than does an increase in bakery products output. Furthermore, a greater portion of the increased agricultural activity in the case of meat packing is of a "direct" nature, i.e. it consists of the direct purchase of agricultural products from the farming sector (cattle and poultry), rather than "indirect", i.e. purchased in processed form through another industry (vegetable

⁹ See particularly (26, pp. 69-72)

oils and cereal fillers). In Table XX the analysis has been carried further to show the total increased activity in the entire economy resulting from an increase of one million dollars in the output of the bakery products and meat packing industries. Although the difference in the total economic stimulating effect of both industries is less than when just agriculture was considered, nevertheless, the increased output of meat packing has some 20% greater overall effect than does that of bakery products. Again the significance of the stimulation to the agricultural sector is apparent as 47% of all increased activity occurs in that sector compared with only 12% in the case of bakery products.

It is apparent from the data presented in the two tables and the discussion in the above paragraph that per unit of output the meat packing industry would have a far greater stimulus on the Prairie Regional economy than the bakery products industry. Furthermore, its raw material requirements are such that about 90% are available within the region or can easily be made available, with little recourse to importing supplies from other regions. This can be seen in greater detail by the data presented in Table XXI and Chart IV which show the specific types of economic activity in each sector of the economy which are generated by an increase of one million dollars in the output of meat products. The table shows that one dollar of consumer demand generates an additional \$1.84 of productive activity in other parts of the economy, about 70% of which occurs within the agricultural sector.

In summary, the purpose of this chapter has been to show that future development of the Prairie Regional economy lies in a greater degree of processing of the basic staple agricultural products which it produces before they are exported. As the outlook for the traditional

TABLE XIX
 AGRICULTURAL REQUIREMENTS OF BAKERY
 PRODUCTS AND MEAT PACKING INDUSTRIES PER
 \$1,000,000 of End Product Output
 (Thousands of Dollars)

Farm Products Used	Bakery Industry Purchasers			Meat Packing Purchases		
	Direct	Indirect	Total	Direct	Indirect	Total
Food Grains & Feed Crops	\$0	\$154	\$154	\$0	\$403	\$403
Meat Animals & Products	0	34	34	729	127	856
Poultry & Eggs	5	6	11	27	4	31
Farm Dairy Products	6	18	24	0	13	13
Vegetables & Fruits	4	6	10	0	8	8
Oil Bearing Crops	20	20	20	0	3	3
All other Products	0	26	26	0	20	20
	\$15	\$264	\$279	\$756	\$578	\$1334

Source: (26, p. 71).

TABLE XX
 TOTAL ECONOMIC ACTIVITY
 REQUIRED TO PRODUCE \$1,000,000
 OF FINAL PRODUCTS OF THE BAKERY AND
 MEAT PACKING INDUSTRY
 (Thousands of Dollars)

Economic Sector or Industry in which Economic Activity takes Place	Bakery Product		Meat Packing	
Food Processing ¹¹	\$1,604	69%	1131	40%
Farming	279	12	1334	47
Fertilizer	5	0	11	..
Agribusiness	1,888	81	2476	87
Container	115	5	19	..
Transport	106	5	64	3
Fuel and Power	38	2	53	2
Chemical	17	1	..	..
All Other	155	6	229	8
Sub Total	431	19	365	13
TOTAL	2,319	100	2841	100

Source: (26, p. 69 & 72).

11. Food processing includes bakery and meat products.

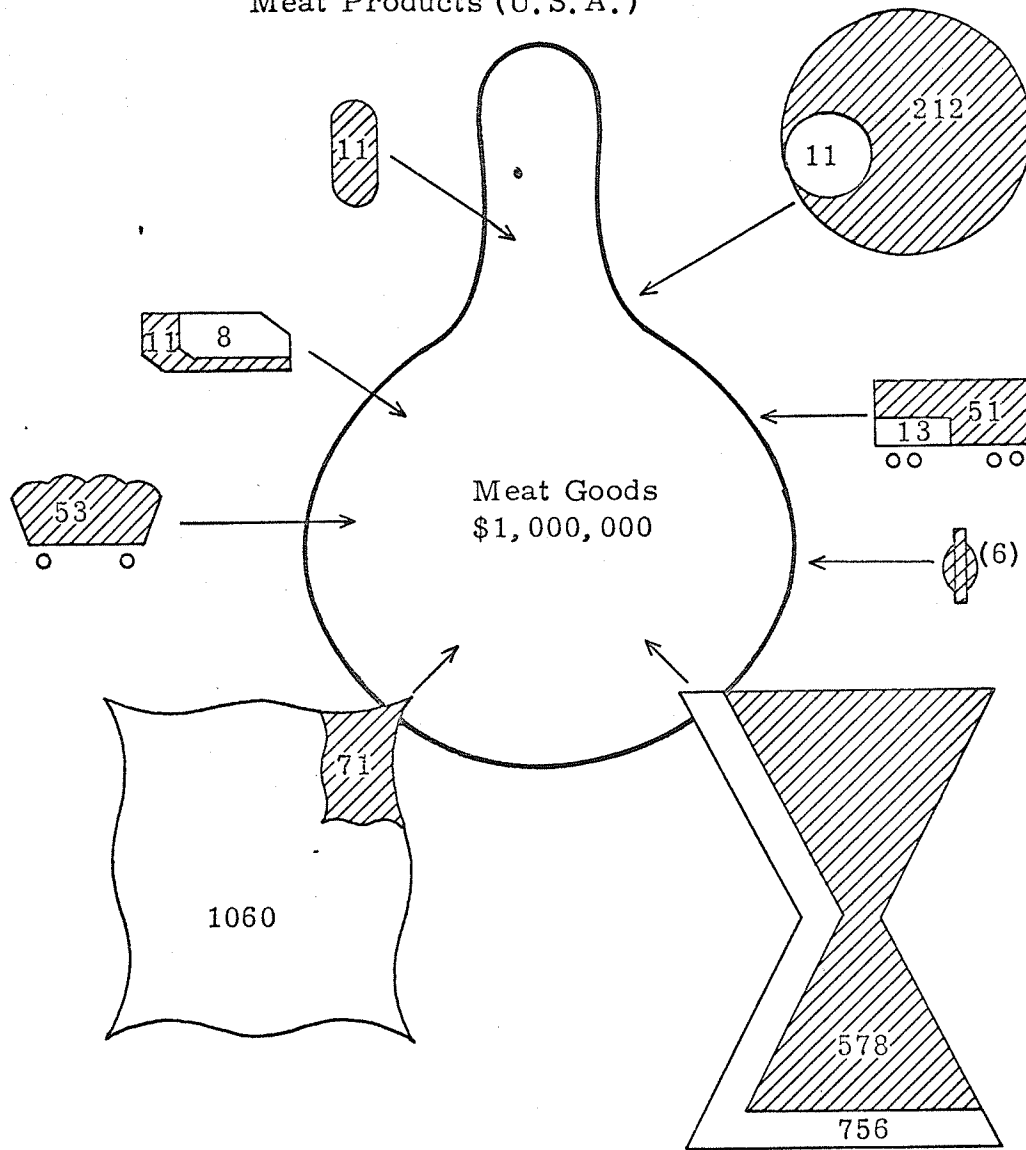
TABLE XXI
 TOTAL ECONOMIC ACTIVITY GENERATED BY
 THE PRODUCTION OF \$1,000,000 OF MEAT PRODUCTS
 UNITED STATES, 1947

(Thousands of Dollars)

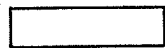
<u>SECTOR OF ECONOMY</u>	<u>Direct</u>	<u>Indirect</u>	<u>Total</u>
<u>Food Processing Sector</u>			
Meat Packing	\$1050	\$ 6	\$1056
Canning, Preserving, Freezing		3	3
Grain Mill Products		46	46
Miscellaneous Food Products	5	4	9
Sugar		4	4
Vegetable Oils		6	6
Animal Oils	5	2	7
Sub Total	<u>\$1060</u>	<u>71</u>	<u>1131</u>
<u>Farming Sector</u>			
Meat and Animal Products	729	127	856
Poultry and Eggs	27	4	31
Farm Dairy Products		13	13
Food Grain & Feed Crops		403	403
Oil Bearing Crops		3	3
Vegetables and Fruits		8	8
Other Agriculture		20	20
Sub Total	<u>756</u>	<u>578</u>	<u>1334</u>
Fibre Processing Sector		6	6
Fertilizer Sector		11	11
(Agribusiness Total)	(1816)	(666)	(2482)
Fuel and Power		53	53
Transportation	13	51	64
Container	8	11	19
All Other	11	212	223
Sub Total	<u>32</u>	<u>327</u>	<u>359</u>
GRAND TOTAL	<u>\$1848</u>	<u>\$993</u>	<u>\$2841</u>

Source: (26, PP. 71 & 72)

Chart IV
Schematic Presentation of Economic Activity
Generated by Production of \$1,000,000 of
Meat Products (U.S.A.)



Key:



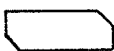
Meat Goods Direct Requirements from
Respective Aggregates



Meat Goods Indirect Requirements from
Respective Aggregates



General



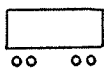
Container



Food
Processing



Fuel and
Power



Transport



Chemicals
Fertilizer



Textile



Farming

Source: Table XXI, Technique after Davis and Goldberg (26).

agricultural staple wheat is not particularly promising and that product does not lend itself to any degree of local processing, another staple export which can be processed locally and exported in large quantities must be found. Such a product does exist in the form of livestock. There is a large and growing market for meat products in Central Canada. The technological developments of the past few decades have all tended to make the meat processing industry locationally attracted to the source of raw materials rather than markets and so suited to locate in the Prairie Region if adequate supplies of cattle are available there. Finally, the meat processing industry is complex and induces a large amount of economic activity in the area wherein it locates and in this way is well suited to form the basis for an industrial complex in the prairie economy.

However, the foregoing conclusions about the meat packing industry are all surmises based upon studies carried out in the United States and the evident similarities of its industrial structures with that of Canada. A true measure of the potential economic stimulus of a growth in the meat processing industry on the prairie economy would require a detailed examination of; the locational forces which would allow the expansion of meat processing in the region, the potential market available outside the region, and the specific effect of the inter-industry relationships of meat packing to the other sectors of the regional economy. Although sufficient data is not available to undertake such an analysis for the entire Prairie Region, a recent study of the potential for developing the livestock industry in the Province of Manitoba, (34) has provided the basic data required to

carry out such an analysis for the economy of that province. Such an analysis and a discussion of the techniques used forms the subject of the next chapter.

CHAPTER IV
SPECIFIC EFFECTS OF MEAT PACKING
ON THE MANITOBA ECONOMY

Technique Used, Input-Output Analysis

There are two basic techniques or methods which can be used to measure the total effects of the growth or development of a new industry on the overall economy of an area or region; they are known as the "economic base" technique and the "regional input-output" technique (also known as the inter-industry relations technique).¹ Both of these techniques are of the multiplier type; i.e. they stress the interrelationship of the various sectors of a regional economy and in effect measure the spread of the impulses or stimulus in any one sector to all other sectors either directly or indirectly. In other words both techniques are based on the assumption that the effect on a regional economy of the injection of a new form of economic activity or industry is similar to the effect produced when a pebble is dropped into a pan of water. The new industry, by its demands for goods and services, creates a back-and-forth movement of forces which spread throughout the local economy and which create a series of effects on each sector of the economy, including a secondary stimulus to the original new industry. Although these effects are not the same in each region and depend upon the structure of the basic economy of the area they will always have a multiplier effect. The two techniques are quite different in their approach and methods and consequently the results obtained are somewhat different. An examination of both

¹ The following discussion of the "economic base" and "input-output-put" techniques is based on Isard (47), particularly Chapters 6 and 8.

techniques will assist in determining which can be used most effectively to measure the effects of a growth in livestock production and the meat packing industry on the Manitoba economy.

The key assumption of the economic base multiplier technique is that in the economy of any region it is possible to distinguish between basic industrial activities, the output of which is largely exported beyond the borders of the region, and services (i.e. non-basic or residential) industry, the output of which is largely consumed within the region. In the words of Isard:

This distinction is in keeping with a premise that has been increasingly taken as a point of departure for regional study. This premise states that the reason for the existence and growth of a region, whether it is a community or a small resource area at one extreme or a huge metropolitan or resource region at the other extreme - lies in the goods and services it produces locally but sells beyond its borders. These "basic" activities not only provide the means of payment for the raw materials, food, and manufactured products which the region cannot produce itself by also support the "service" activities, which are principally local in productive scope and market areas (47, p. 190).

The techniques for using the economic base multiplier were developed in the late 1930's in the United States and have been the subject of extensive writing during the past two decades.² The key to the technique is the determination of the "basic-service ratio". This ratio describes either the proportionate share between the total employment in a region's "basic" or export oriented activities and total employment in its service or "local" industries, or the proportionate division between the increase in the employment in a region's "basic" or export oriented activities and the increase in the employment in its "service" or locally oriented industries. The multiplier

² For some of the more widely known works, see Isard (47, pp. 189 and 190, f.f.).

is calculated from the data required to compute the basic-service ratio. It is expressed as the total (or increase) in employment in both basic and service industries divided by the total (or increase) in basic employment alone.

The technique can be illustrated by examining a study of the economic base multiplier in the Wichita Kansas area between 1940 and 1950 (47, pp. 190 and 192). Table XXIII shows the employment by economic sectors in Wichita in both years divided into employment in industries producing for the local market (service) and for export markets beyond the region (basic). The overall regional employment multiplier and the basic-service ratio are calculated from the total employment in the service and basic industries as shown in Table XXIII. It can be seen that using the different years and different methods of computation, a different regional employment multiplier is obtained. The specific multiplier used will depend upon the nature and purpose of the specific study.

The particular benefit of economic base multiplier studies is that they contribute to an understanding of the functions of the various economic components of a region. In particular they serve to identify and highlight the export activities which are necessary for the economic progress and even the very existence of the regional economy. They also help to point out the region's economic connections with and the services provided to other regions. However, it is noted that this technique does not examine the nature and scope of the imports into the region which are very important for a complete understanding of the

functioning of the local economy.³

In addition to the base multiplier technique,⁴ the other regional multiplier analysis which yields quantitative results of some value is that associated with the use of regional input-output technique. (47, p. 189). The strength of this technique is in the detailed manner in which it presents the production and distribution characteristics of individual industries within a region and the nature of the interrelationships among the various industries which comprise the economy of the region.⁵ Perhaps its most important contribution is that it offers a technique to determine statistically the effect on all sectors of the economy of an increase in the activity or output of one specific industry or sector of the economy. The questionable assumption about using the input-output technique to measure the effects on the economic structure of a region of an injection of a specific new industry, particularly if this injection is to take place some time in the future, is that of constant production co-efficients, i.e. that the interrelationships of industries or sectors of the economy will remain stable both under the impact of a new industry or rapid growth in a specific sector as well as over time.

3 For a detailed evaluation of the "economic base" technique see Blumfield (8).

4 An example of another technique is the "interregional trade multiplier" which focuses attention on the interplay of inter-regional forces. Unfortunately this technique is still too theoretical to be considered here. For a detailed description see: R. Vining (71).

5 Other advantages of this technique are that it: records rather concisely, in an internally consistent manner, a large amount of information about an economy and the interrelations of its sections; imposes a desirable statistical discipline on data collection agencies and imperial investigation; and it reveals gaps in available data.

An examination of the United States economy during the past four decades indicates that inter-industry relationships in the economy remain remarkably stable over time and those changes which do occur are quite predictable , such as the substitution of oil for coal and highway transportation for rail transportation. The basis for this conclusion are examinations of the three input-output models which have been made of that economy, the two by Leontieff (1919 and 1929) (49) and the 1947 model by the Department of Labour (29). Both Isard and Caves and Holton made such a comparison and both can to this conclusion.⁶ In fact Caves and Holton used the only input-output model that has ever been prepared of the Canadian economy (by the Dominion Bureau of Statistics for the year 1949) (12) as a basis for projecting Canadian economic activity to 1970. Caves writing at a later date made the following statement about the Canadian 1949 model.

The Bureau's inter-industry (input-output) table for Canada for the year 1949 may be used to provide considerable information about the Canadian economy. Even where definite conclusions have not been forthcoming, inter-industry analysis at least aids a clear formulation of the problem, as in the question of the vulnerability of the economy to external shocks and the propagation of rapid growth in extractive industries. --- Input-output analysis has been shown by other writers to be applicable to economic problems varying from the development of under-developed areas⁷ to market analysis by business firms.⁸ --- Ideally, this tool might be used over wide fields in increasing both the "practical" and "academic" knowledge of the Canadian economy (18, p. 329).

An examination of the "economic base" technique and the "regional

⁶ See Isard (47, p. 327) and Caves and Holton (19, pp. 413-421).

⁷ For example, see Bishop (4) and Gosfield (35).

⁸ For example, see Evans (32) and Leontieff (50).

TABLE XXII

WICHITA EMPLOYMENT 1940 & 1950
CLASSIFIED BY TYPE OF MARKET SERVED

Economic Sector	Total Employment		"Service" Industry		"Basic" Industry	
	1940	1950	1940	1950	1940	1950
Agriculture	4074	3276	1109	1442	2965	1834
Mining	925	971	50	71	875	900
Construction	2837	7297	2837	7297	....	....
Manufacturing	8692	23931	2705	4605	5987	19326
Wholesale & Retail	13219	21158	10115	17283	3101	3876
Transport & Utilities	4473	6833	3732	5576	721	1257
Other Services	16985	24266	15694	22208	1291	2058
Not Reported	886	843	886	843	....	....
TOTAL	52,091	88,575	37,148	59,325	14,943	29,250

Source: (47, P. 192)

TABLE XXIII

BASIC - SERVICE RATIOS AND MULTIPLIERS
WICHITA

	Basic - Service Ratio	Regional Employment Multiplier
- Based on Total Employment 1940	$\frac{14,943}{37,145} = 1:2.5$	3.5
- Based on Total Employment 1950	$\frac{29,250}{59,325} = 1:2.0$	3.0
- Based on Change in Employment 1940 - 1950	$\frac{14,307}{22,177} = 1:1.6$	2.6

Source: (47, P. 192)

"input-output" technique leads to the conclusion that both have certain strengths and weaknesses and that the most comprehensible overall examination of the potential economic growth of a region would be one based on the use of both techniques. However, the same examination leads to the conclusion that the latter technique can be more readily adapted to the data which is available. For this reason input-output analysis is the technique which has been chosen to measure the specific effects of the potential increase in the output of the meat packing industry on the Manitoba economy.

Future Growth of the Meat Packing Industry in Manitoba⁹

In the main, the future growth of the meat packing industry in Manitoba will be a function of three variables; the potential consumer demand for meat products in Canada, the amount of livestock which is raised in the Prairie Region which is accessible to Manitoba processing plants, and the economic and technical forces which make locating meat packing plants within the Province feasible. An examination of each of these factors is required to determine an economically justified potential output of the meat packing industry in Manitoba in the year 1975.

The raising of livestock and livestock products constitutes a much greater part of agricultural activity in Central Canada than in the Prairie Region as shown in Table XXIV. However, the population growth in Central Canada, together with an expanding livestock industry in the Prairie Region, have led to an growing volume of beef and pork

⁹ The discussion in this section is based on Gilson, etc. (34).

TABLE XXIV

PROPORTION OF FARM CASH INCOME DERIVED FROM CROPS AND LIVESTOCK,
SELECTED PROVINCES, CANADA

<u>Year</u>	<u>Total From Crops</u>	<u>Total From Livestock and Products</u>	<u>Other Products and Sources</u>
ONTARIO			
1945-49	24.5%	74.4%	1.1%
1950-54	24.6	74.4	1.0
1955-59	24.8	74.4	0.8
1960	28.4	70.8	0.8
QUEBEC			
1945-49	11.0%	80.8%	8.2%
1950-54	9.9	82.5	7.6
1955-59	9.4	83.8	6.8
1960	10.6	83.8	5.6
ALBERTA			
1945-49	54.8%	45.1	0.1%
1950-54	53.6	46.1	0.3
1955-59	42.8	56.0	1.2
1960	38.3	56.3	5.4
SASKATCHEWAN			
1945-49	72.7%	27.1%	0.2%
1950-54	75.3	23.7	1.0
1955-59	69.5	28.9	1.6
1960	66.1	26.7	7.2
MANITOBA			
1945-49	58.4%	41.2%	0.4%
1950-54	56.4	43.3	0.3
1955-59	47.8	51.0	1.2
1960	47.2	48.0	4.8

Source: (34, p. 6:2)

being moved from the latter to the former region for consumption. In fact, the movement of livestock and beef and pork from surplus to deficit producing regions in Canada has become an increasingly important characteristic of this industry during the past few decades. In the period 1950-54, the average annual movement of beef and pork between the regions of Canada was close to 500 million pounds, or 29% of the total beef and pork produced in Canada. By 1960, approximately 800 million pounds of beef and pork, or 34% of the total production in Canada, were being moved from the surplus to the deficit meat producing regions, and it is expected that this trend will continue.

During the past ten years Ontario has been almost self-sufficient in terms of beef and pork production. However, in the next few decades it is expected that the population of Ontario will increase much more rapidly than beef and pork production, with the consequence that by 1975 that province will be importing about 30% of its beef and pork requirements. Quebec has always been a large importer of beef and pork. Between 1950 and 1960 beef and hog producers in that province were only able to supply about 46% of the total consumption of red meat and by 1975 will probably only be able to supply about one third of these requirements. The rapidly expanding population growth in British Columbia will create a market for some 289 million pounds of beef and pork in addition to that produced within the province in 1975. As a consequence of the combined influence of these trends, it is estimated that 1.3 billion pounds of beef and pork, or 45% of the total production, will be moved from the Prairie Region to the deficit areas in British

Columbia and Central Canada by 1975. The anticipated change in the supply and consumption of beef and the consequent change in the surplus or deficit of meat requirements produced in each area between the annual average for the period 1955-1959 and 1975 is shown in Table XXV.

It is most likely that Alberta, with its large surplus of beef and pork, will continue to supply the British Columbia market. The remainder of the surplus in Alberta, together with the surplus beef and pork produced in Saskatchewan and Manitoba will move eastward to Central Canada and the Atlantic Region. Alberta and Saskatchewan have been and, as indicated in Table XXV, will continue to be larger net exporters of beef and pork than Manitoba. Nevertheless, exports from this latter province are expected to increase substantially as it is anticipated that beef and hog production in Manitoba will increase proportionately faster than consumption during the next few decades. As a result, Manitoba livestock producers will probably be exporting around 60% of their total production to other provinces for consumption by 1975.

All cattle and hogs, however, are not slaughtered and processed within the provinces where they are produced, and substantial quantities of live animals move into British Columbia, Manitoba and Quebec from other provinces for slaughter (34, p. 8:1). Other factors than just the source of livestock are important in determining the location of meat processing plants, such as the differential in the transportation cost in shipping live animals versus dressed meat, the ability to maintain

TABLE XXV
 SUPPLY AND CONSUMPTION OF BEEF AND PORK
 BY PROVINCE

(Millions of Pounds)

	1955-59			1975		
	Supply	Consumption	Surplus (Deficit)	Supply	Consumption	Surplus (Deficit)
<u>SURPLUS AREAS</u>						
Manitoba	191	111	81	407	163	244
Saskatchewan	351	114	237	581	157	424
Alberta	605	150	456	1246	275	971
<u>Total Surplus</u>	<u>1147</u>	<u>375</u>	<u>772</u>	<u>2234</u>	<u>595</u>	<u>1639</u>
<u>DEFICIT AREAS</u>						
Ontario	683	721	(38)	917	1345	(427)
Quebec	283	611	(328)	366	1094	(728)
British Columbia	43	189	(145)	59	349	(289)
Maritimes	43	235	(191)	74	341	(267)
<u>Total Deficit</u>	<u>952</u>	<u>1756</u>	<u>(804)</u>	<u>1416</u>	<u>3129</u>	<u>(1713)</u>
<u>NET BALANCE</u>	<u>2099</u>	<u>2131</u>	<u>(32)</u>	<u>3650</u>	<u>3724</u>	<u>(74)</u>

(Note: Supply equals total marketings minus inward movement.
 Each province is therefore credited with all feeder animals
 shipped to other provinces for feeding.)

Source: (34, pp. 7:2 & 7:3).

the quality of dressed meat during the time it is being shipped, and losses incurred due to the bruising, crippling and death of live animals in transit. Recent technological developments in both processing and transportation have changed the locational effect of the above factors and will likely continue to do so in the future. For example, the recent introduction of new refrigeration techniques by railways and truckers has improved the maintenance of dressed meat quality in transit to the point where a traditional discount of about one and one half cents per pound on prairie dressed meat in eastern markets has disappeared. This discount formerly gave meat processing plants located in Central Canada an automatic price advantage of about 75 cents per live hundredweight over similar plants located in the Prairie Region in selling to the eastern markets. As Gilson, Ackerman, etc., put it: "This technological change alone was sufficient to establish the economic advantage of slaughtering in Western Canada and the shipment of meat and by-products rather than live animals to the deficit consumer markets in Eastern Canada." (34, p. 8:12).

In Manitoba the meat processing industry is extremely vulnerable to the locational effect of technological changes, as its position is unique in Canada. Of all the interprovincial movements of live animals, only those shipped into Manitoba for slaughter represent a form of processing in transit. Live animals, particularly from Saskatchewan, are shipped to Winnipeg for slaughter and subsequent shipment to eastern markets as dressed meat. Practically all other

interprovincial movements of livestock go directly to slaughtering plants in the province where they are finally consumed. In no other province is the meat packing industry dependent on extraprovincial sources for its primary supplies as well as its final market. (34,p.8:1)

How has the Manitoba meat processing industry attained this unique position in Canada? What admixture of economic forces has stimulated such a development? The answer is provided by the economic theory of locations which is based on the premise that industrial structures, such as the meat processing industry, will invariably locate at the point of minimum transfer costs (the sum of all costs associated with moving the materials required by or produced by the industry).¹⁰ This point of minimum transfer costs is arrived at through the interplay between procurement costs and distribution costs and will result in three possible orientations; to raw materials, to markets, or at some intermediate point. An orientation to raw materials is normal if that material has a large weight loss during initial processing.¹¹ An orientation to markets is normal if there is a weight gain in the raw materials during processing or if the final product is fragile, bulky or in other ways difficult to transport.

10 The following discussion of location theory is based on Hoover (39, pp. 29-46).

11 Other factors influencing an orientation to raw materials are: large fuel requirements influencing a location near the source of fuel such as cement, glass, calcium carbide and synthetic nitrate; if relative weights of raw materials and products are roughly equal but procurement costs per ton mile are greater than distribution costs such as preserving foods of all types; and industries that collect, sort and procure small products from a number of local producers and transship in bulk such as grain elevators, freight forwarders and junk dealers.

Chart V
 Locational Pull of Transfer Costs
 Raw Material Orientation

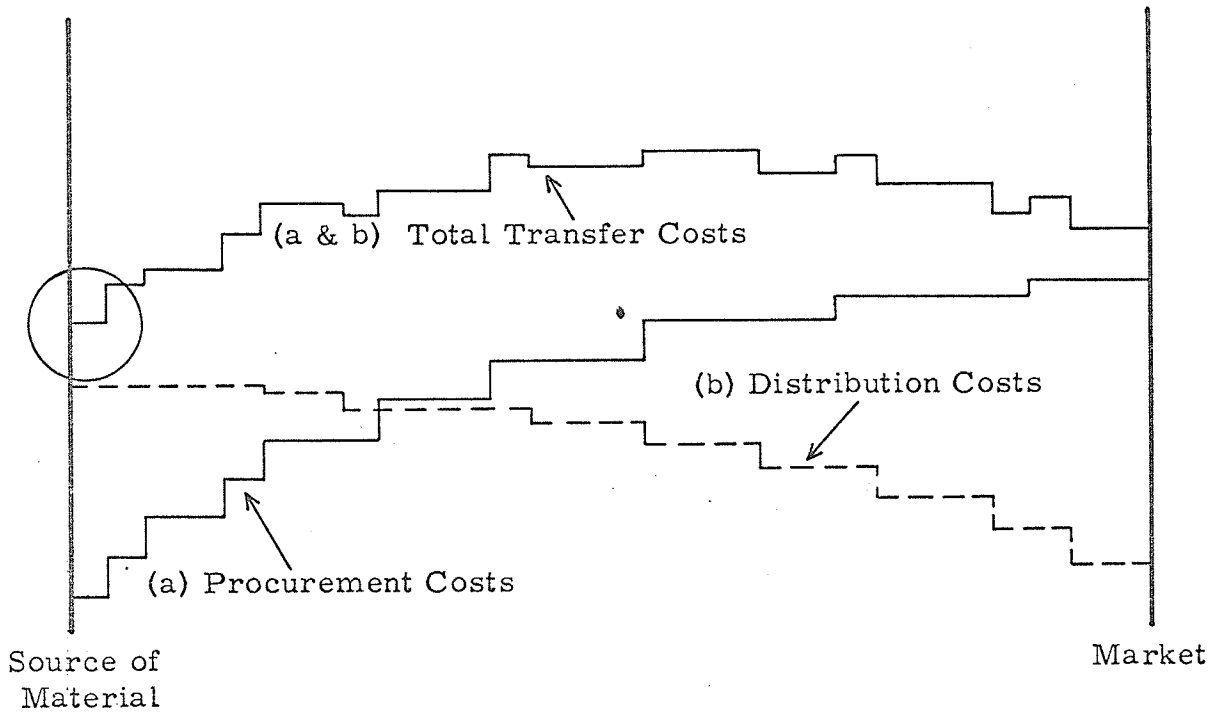
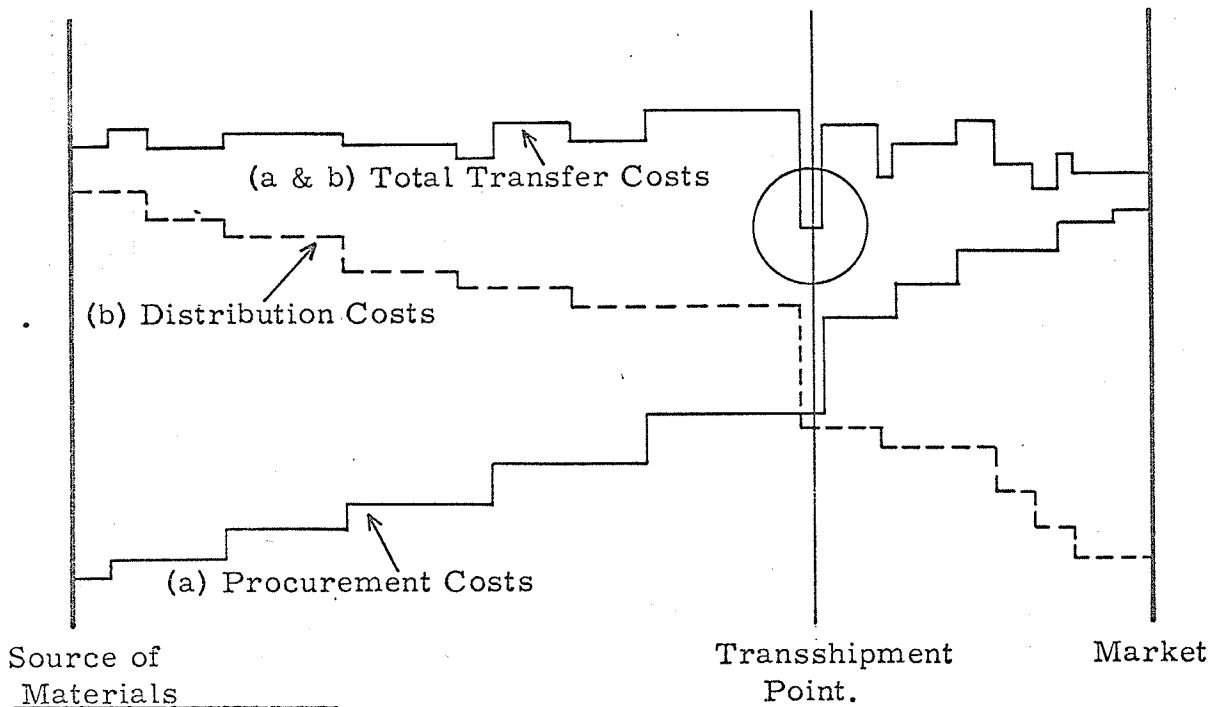


Chart VI
 Locational Pull of Transfer Costs
 Intermediate Point Orientation



Source: Chart V - (39, p. 30), Chart VI - (39, p. 39)

An intermediate point location is really an exception caused by some obstruction in the transportation system such as "in transit privileges"¹² or a change in the type of transportation system, e.g. from highway to rail or rail to water. As a generalization, one can say that early stages of production tend to be material-oriented and later stages market-oriented while intermediate stages are relatively foot-loose depending upon transfer considerations (39, p. 29).

Charts V and VI are diagrammatic representations of industries whose transfer costs are such that they would locate respectively at the source of materials and at an intermediate point. In both cases it can be seen that the charts show the gradients of procurement costs, distribution costs and total transfer costs per unit of product produced. In Chart V a very small reduction in the gradient of procurement costs or a slightly greater gradient in distribution costs would result in a shift in location forces to the market. The location of activity at intermediate points is complicated by the fact that the peculiar structure of transfer costs reduces the number of advantageous procurement and distribution points. Furthermore, the transfer of goods and services does not proceed as the crow flies but is channeled along organized transfer routes with rates or costs depending upon the terrain and the density of traffic. Terminals and junctions also tend to "warp" the straight cost progression of transporting goods by providing

¹² "In-transit" or "stop-off" can be defined as an arrangement where railways allow a shipment to be stopped off en route to permit some process to be performed on the freight and then re-shipped to its final destination at the through rate applicable from the original shipping point to destination. See A.W. Currie (22, p. 327).

lower rates for longer hauls and producing a series of critical trans-shipment points. These types of peculiarities in transportation cause the development of strategically located transfer "nodes" with special locational advantages as procurement and distribution points and therefore as processing centres for all kinds of activities in which transfer costs are locationally important. "There are only a limited number of such nodal points, and each is a production centre for manufacturing as well as for trading and intermediate handling operations."

(39, pp. 119-120).

It is primarily the interplay of the type of transportation factors described above which historically has made Winnipeg a major centre for processing livestock raised in all three prairie provinces. The major economic advantage for Winnipeg as a livestock processing centre has been its location as the major railway transfer "nodal" point between the scattered sources of livestock in the prairies and large meat markets in Central Canada. Normally, in the past it has been more economical to ship finished livestock east from a large part of the Prairie Region by the most direct route and process it in Winnipeg, as it costs less to ship the meat and by-products from there to Toronto, the major collection and distribution point of the Central Canadian market, than it costs to ship live animals.

In recent years, however, changes in transportation costs and technology, shifts in sources of supply and consumer markets, as well as changes in primary marketing methods have resulted in a much greater

proportion of cattle being slaughtered closer to the source of supply than Winnipeg. New meat processing plants are and probably will continue to be located closer to the area where the livestock are produced. Although a number of changes in the above mentioned factors are affecting the shift in the location of meat processing plants in the Prairie Region, the primary cause is changes in transportation costs. In the meat processing industry, transportation costs as they apply to the movement of livestock and meat, are composed of two elements; the cost of shipping livestock versus dressed meat, and the cost of tissue shrinkage. With regard to the former, Winnipeg plants have a transportation cost advantage over plants in most other western cities in the processing of both cattle and hogs, especially when the stock originates at points between Winnipeg and other cities in which meat processing plants are located. Even when the stock must pass through other cities in which plants are located, from the point of view of shipping costs alone Winnipeg plants still may have a small advantage.¹³ Shrinkage costs, however, favour a plant location as close as possible to the source of supply, and any advantage in the cost of shipping livestock versus dressed meat that Winnipeg plants have over plants located further west is negated, or at best drastically reduced by the extra shrinkage cost in shipping live animals to Winnipeg.

13 The transport cost advantage of Winnipeg versus plants further west in all probability will continue to decrease as meat transportation techniques such as refrigeration, loading, hanging, etc. are improved.

The relative transportation and tissue shrinkage costs incurred in shipping livestock from the six major gathering points in the prairies (points of origin) to various packing plant locations and transshipping the dressed meat to Toronto is shown in Table XXVI. An examination of the data on the costs for transporting cattle reveals that when both transportation and shrinkage costs are taken into account, Winnipeg plants are at a locational disadvantage for the slaughter of cattle originating in areas west of other plants. For production areas east of Regina and Saskatoon, Winnipeg is the most economic location for processing cattle. This can be seen quite clearly in Chart VII which shows how the total cost of shipping cattle from four of the six gathering points in the prairies to Toronto increases as the distance from the gathering point to the location of the meat processing plant increases. The chart also shows that the only gathering point west of Manitoba wherein Winnipeg is the least costly location to process meat is Melville in eastern Saskatchewan.

It is noted in Table XXVI that shrinkage costs do not offset Winnipeg's shipment cost advantage as fully for hogs as they do for cattle and the province retains a net advantage over many prairie points in the processing of hogs, but the advantage is relatively small and could be eradicated by technological improvements in shipping meats or a small change in transportation rates. For these reasons, the area from which Manitoba based meat processing plants will economically be able to draw livestock supplies during the next decade or so, without

TABLE XXVI

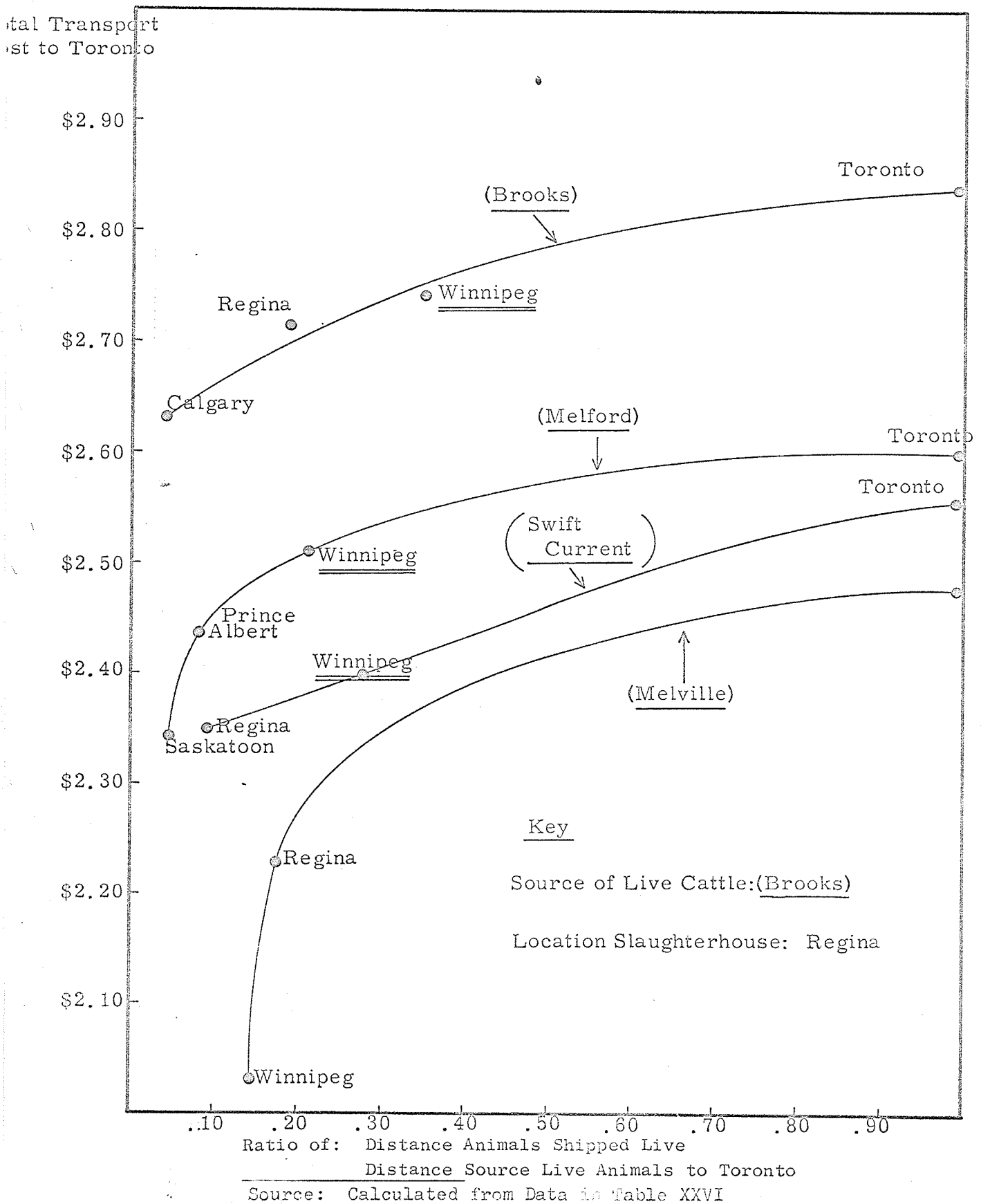
COMPARISON OF TRANSPORTATION AND
TISSUE SHRINKAGE COSTS INVOLVED IN
SLAUGHTERING AT VARIOUS LOCATIONS
FOR SHIPMENT TO TORONTO MAY 1962
(Cents Per Hundredweight Live)

ORIGIN OF LIVESTOCK	PLANT LOCATION	COSTS FOR CATTLE				COSTS FOR HOGS		
		TRANSPORT	SHRINKAGE	COMBINED	ADV. WPG	TRANSPORT	SHRINKAGE	COMBINED
Brooks, Alta.	Calgary	259	4	263	-11	291	3	294
	Regina	257	15	272	- 2	283	11	294
	Winnipeg	249	25	274	...	270	19	289
	Toronto	226	58	284	+10	258	44	302
Swift Current	Regina	230	5	235	- 5	256	4	260
	Winnipeg	224	16	240	...	245	12	257
	Toronto	209	49	258	+18	232	37	269
Melfort	Prince Albert	241	2	243	- 8	271	2	273
	Saskatoon	229	4	233	-18	256	3	259
	Winnipeg	229	22	251	...	250	16	266
	Toronto	204	55	259	+ 9	235	41	276
Melville	Regina	219	4	223	+20	245	3	248
	Winnipeg	194	9	203	...	215	7	222
	Toronto	204	43	247	+44	219	33	252
Lloydminster	Saskatoon	240	7	247	-24	267	5	272
	Winnipeg	247	24	271	...	268	18	286
	Toronto	222	57	279	+ 8	257	43	300
Winnipeg	Winnipeg	144	..	144	...	165	..	165
	Toronto	158	27	185	+41	180	21	201

Source: (34) pp. 8:9 to 8:11).

Transportation Costs of Slaughterhouses
Serving the Toronto Market

(Costs of Cattle from Four Key Gathering Points)



incurring greater combined transportation and shrinkage costs than alternative plants have to pay, extends westward to include only the eastern half of Saskatchewan (34, p.8:7).

TABLE XXVII
LIVESTOCK AVAILABLE TO
MANITOBA MEAT PROCESSING INDUSTRY,
1960 - 1975
(Thousands of Head)

	1960		1975	
	Number	Percent	Number	Percent
<u>Cattle and Calves</u>				
From Manitoba	291	65.4%	570	62.3%
Imports	154	34.6	345	37.7
Total	445	100.0	915	100.0
<u>Hogs</u>				
From Manitoba	506	66.2%	1050	65.6%
Imports	258	33.8	550	34.4
Total	764	100.0	1600	100.0

Source: (34, p.8:22-8:26)

Although by 1975 the meat processing industry in Manitoba will be restricted in its source of supply to that livestock which can be produced within the province and in the eastern portion of Saskatchewan, the total supplied available to it in 1975 from this relatively restricted area will be more than twice as large as those which were available in 1960, as shown in Table XXVII. This forecast is based on a recent study made of the potential for increasing the livestock output of Manitoba (34) and assumes that the proportion of livestock imported from eastern Saskatchewan will remain constant.

The data contained in Table XXVII measures the increase in the supply of raw materials between 1960 and 1975 which the meat packing industry economically could obtain in competition with meat processing plants located further to the west or the east. Before it can be determined whether it would be reasonable to expect the meat processing industry to expand to this extent, the anticipated increase in the consumer demand for meat products in Canada must be examined in

greater detail relative to the potential Manitoba output. As was discussed earlier in Chapter III,¹⁴ the total demand for meat products is determined by price, the level of consumer disposable income, population growth and the export markets. When all these factors are considered it is estimated that total consumption of meat in Canada will increase to about 4.1 billion pounds by 1975, or 58% above the level of consumption in 1960. The major portion of this meat is and will remain beef and pork, and the past, present and projected consumption of both of these are shown in Table XXVIII. This table also shows the anticipated net exports of these two products, the slaughter animals required and compares this with the present and projected portion of animals that are and economically can be slaughtered by the meat processing industry in Manitoba.

If the Manitoba meat processing industry did slaughter all the 915,000 head of cattle which economically can be made available to it in 1975, it will only increase its proportion of the total Canadian slaughter by some 3% over that proportion attained during the past decade. In the case of hogs, if the total 1,600,000 available in 1975 are slaughtered, the proportionate increase will be only about 4%. In view of the economic advantage of processing cattle in the prairies and shipping the dressed meat to Central Canada and the increase in the size of the deficit in livestock production which will occur in that region between now and 1975, it would appear that the demand for meat processed in Manitoba will be more than sufficient to absorb the potential increase in the supply of slaughter animals forecast in Table XXVII.

¹⁴ See pp. 106-109.

<u>Year</u>	Total Can. Consumption of Meat (Millions Lbs.) (1)	Ne	IN MA	
.....C				
Av. 1950-54	954			
Av. 1955-59	1286			
1960	1368			
Projected 1975	2198			
.....F				
Av. 1950-54	762			
Av. 1955-59	845			
1960	983			
Projected 1975	1525			

Source: (15, p. 11, Table II) and (34, pp

On the basis of the above described supply and demand forecasts, it will be assumed that the output of the Manitoba meat processing industry will be increased to the rate of output in 1975 equivalent to the slaughter of 915,000 head of cattle and 1,600,000 hogs. This is equivalent to an increase of 460,000 cattle over present production (915,000-445,000) and an increase of 836,000 hogs (1,600,00-764,000). Assuming constant livestock prices, a constant ratio in the output of beef and pork to other products and poultry, and constant production costs, if this additional amount of livestock is slaughtered the output of the Manitoba meat processing industry will be \$151,338,000 more in 1975 than in 1960.¹⁵ We will now examine the possible impact of such an increase in the output of the meat processing industry on the provincial economy.

Input-Output Model Showing Total Effect on Economy

Except for the foregoing discussion of supply, demand and transportation costs, it is not the intent here to present a comprehensive analysis of the forces affecting the location of the meat processing industry in Manitoba. Rather it is an attempt to appraise the direction and strength of the force generated by this industry upon all types of economic activity within the provincial boundaries. In order to fully illustrate this, the anticipated increase in meat processing between 1960 and 1975 in the following model is viewed as an

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- ¹⁵ The technique of converting the increased slaughter of cattle and hogs into dollar output is as follows:
1. Total cost of increased cattle and hogs at current prices equals \$95,395,200.
 2. At the current ratio of the cost of cattle and hogs to the total output of the meat processing industry in Manitoba this will convert to a total increase in output of \$151,338,000.

injection of new activity into the local economy at the latter date. In other words, it is treated as if a new meat processing industry with an annual output of \$151,338,000 will be located in Manitoba in 1975 and will require new inputs from agriculture, other industries, transportation service, etc., above and beyond those being produced in the province at that time. In reality, of course, this entire process would be evolutionary and would occur gradually throughout the period to 1975 but the end result in overall economic expansion in the province in 1975 will be similar.

The method used to construct this input-output model was to adapt the inter-industry study of the Canadian economy in 1949 prepared by the Dominion Bureau of Statistics (12) to the peculiarities and differences in the structure of the Manitoba economy. The technique used is the same as that used by Isard and Kuenne in their study of the impact of a new primary steel mill on the economy of the Greater New York-Philadelphia industrial region (45). These writers adapted the input-output study of the United States economy to the peculiarities of the economy of the New York-Philadelphia region and used it as the basis for their projections. The same procedure is followed here with one exception. In the Isard-Kuenne model a separate and distinct estimate had to be made of the secondary economic stimulus which would result from the growth in or establishment of new steel using industries that would locate in the area to be near the new primary steel mill. The meat processing industry, however, produces few intermediate products and almost all its output is sold directly to the consumer market. Therefore, no such separate estimate was made of the growth of industry using products produced by meat processing, except to define meat processing in broad terms to include the output of directly related

by-products such as fats, oils, animal feeds and bone meal fertilizers. In this respect it is noted that the results of the projection will tend to be conservative in that they do not make allowance for some related industries that could be established in the province such as leather tanning and manufacturing, frozen and condensed prepared foods.

In designing the model, the input-output matrix of the Canadian economy which was used is that contained in the supplement to the original study issued by the Dominion Bureau of Statistics in 1960. The reason for using the tables in the supplement is that they are based on more up-to-date data that is in a form which allows the resulting projections in dollar value to be readily converted into employment by correlation with other industrial output and employment data published by the Bureau. To quote from the preface of the supplement:

The publication of the revised "National Accounts, Income and Expenditure, 1926-1956 in 1958" changed some of the figures in "The Inter-Industry Flow of Goods and Services, Canada 1949" which had been published in 1956. This supplement to the latter publication incorporates these revisions and also makes a change in the method of routing commodities through distributive channels from producer to user. The change from a system of purchasers' prices to producers' prices simplifies some analytical uses of an inter-industry flow table and also enables the user to relate output totals ... more closely to other production figures published by the Dominion Bureau of Statistics (12, preface).

The basis for the model is taken from data which measures actual physical activity (rows 1-43) in Tables 1 and 3 of the document referred to above. However, some modifications were made. In the first instant, since in regional analysis it is important to include local employment effect of additional income, which is not measured using this technique, an estimate of such employment derived from "Economic Base" studies is included. New construction was removed

from the matrix, since the projection is made for more than a decade hence by which time the construction of new plant and facilities will have been completed, and it would artificially inflate the longer term economic effect which is being measured. However, a crude "rule of thumb" measurement of the increased repair and maintenance construction required is discussed later.

Before going on to discuss the Manitoba model, it is necessary to examine in more detail the technique of projection which was used. As was noted earlier, the effect of injecting any specific increase in economic activity into an area or region, such as the increase in meat processing into the Manitoba economy, can be likened to the effect of throwing a pebble into a pond. The initial input has repercussive effects which interact to cause further expansion, i.e. the initial input causes what can be termed a first round of expansion in the local economy. The production of this first round of expansion requires a smaller but significant set of inputs for each sector of the economy which when summed makes a second round of expansion. In turn, this second round of expansion causes a smaller but again significant third round of expansion and so on to infinity. The sum of the effect of these rounds of expansion can be determined by a technique known as the "iterative approach" (47, pp. 328-332). To use this technique one must first construct an input co-efficient matrix of the input-output table, which shows the input into each industry per dollar of output of a particular industry.¹⁶ Using this matrix the first round of expansion is calculated (that is the inputs required to operate the new industry at the forecast level). The net sum of the first round of expansion is then multiplied by the matrix

¹⁶ A matrix is defined as a rectangular arrangement of quantities or symbols, for example see (12, Table 2).

values to determine the second round and so on. The net totals of each round of expansion are then summed to arrive at the total increase in activity. However, all of these round-by-round computations can be performed with one calculation by using an inverse matrix derived from the basic matrix. Such an inverse matrix, calculated by high speed computing machines, yields both the direct and indirect (through an infinite number of rounds) requirements of each sector of the economy per dollar of output of the new industry (47, p. 332). Fortunately, Table 3 of the Bureau's supplement to the inter-industry flow of goods and services study of the Canadian economy contains such an inverse matrix which was used as the basis for the projection of the effect of the forecast increased meat processing on the Manitoba economy.

On the basis of the technique described above, the calculation was proceeded with as shown in Table XXIX. The first part of the table shows the 42 sectors of the economy included in the Bureau's input-output study of the Canadian economy, construction has been omitted and a "household" sector included. Column (1) is the inverse matrix value which shows the total cumulative round by round increase in output which will be required from each sector of the economy for each dollar's increase in output of the meat processing industry.¹⁷ However, not all of the increase in the output will occur within the province of Manitoba, which has what can be termed an open economy. Many of the goods and services used in production are imported; furthermore the provincial economy has a different industrial mix than the overall economy of Canada (which is the basis for column (1)). Both of these facts must be allowed for in

17 It can be seen from column one that because of the "feedback effect", a \$1.00 increase in the output of the meat processing industry will induce an additional 0.1¢ increase in the output of that industry.

order to determine the total output which will take place within the various sectors of the Manitoba economy as a result of each dollar's increase in output in the meat processing industry. This is done in column (2) which shows the proportion of the increase in output in each sector of the economy which will take place within the province. The proportion of local production was arrived at by an examination of relevant data published by the Dominion Bureau of Statistics, the Province of Manitoba and some of the background papers prepared for the Committee on Manitoba's Economic Future. With the limited data available, it was not possible to develop or use a single technique to arrive at the respective proportions, each of which was determined independently, using a subjective evaluation in those few cases for which virtually no data was available. The data in each of the rows in column (1) & (2) were multiplied to obtain the actual increase in output in each industry or sector of the economy which will take place within Manitoba for each dollar's increased output in the meat processing industry and the result shown in column (3). Column (4) shows the total increase in activity or the output of each sector of the provincial economy which will result from the total forecast increase in meat processing, \$265,794,000 or 70% more than the increase of \$151,338,000 in meat processing.

The final step was to translate the increase in the value of output of each sector of the economy into employment. This was done by determining the ratio of output to employment for each sector from published statistics and census data. These ratios are shown in column (5), which in all instances except agriculture reflect average employment and output during the last three years for which data is available.

In the case of agriculture, the employment ratio was reduced to allow for the anticipated increase in productivity. The total increase in employment in each sector of the economy or industry in Manitoba included in the matrix was arrived at by dividing the data in column (4) by that in column (5) and is shown in column (6).

To the total employment in column (6), must be added the new construction maintenance and repair employment required and the employment generated by new income. An estimate of construction employment was arrived at by assuming that the ratio of construction employment to new employment in Manitoba (the total of column (6)) would be similar to the ratio of construction workers to the labour force in the national economy.¹⁸ This will result in an additional 1,175 construction workers being employed in the province in 1975. An estimate of the employment generated by new income was arrived at by an examination of a number of economic base multiplier studies. These indicate that a conservative estimate of the regional employment multiplier for a province such as Manitoba is about 2. Based upon this multiplier, and assuming that some three-quarters of the increased employment in agriculture and meat products is "basic" (i.e. producing goods for export beyond the province), the total new employment should be approximately 25,155. However, the new

¹⁸ Calculated in this way construction does not include the activity required to build any new plant and equipment needed by the expanded meat processing industry. Not only would such a measurement be difficult because of the extent of the excess capacity which is characteristic of this industry but, as noted, such construction is a short term type of activity which has no lasting stimulating effect on the economy other than that which has been included.

employment in column (6) plus construction employment is only 23,355. The difference is considered to be the local employment generated by new income, about 1800 jobs.

From the combination of the total employment shown in column (6) plus the construction employment, it can be seen that the forecast increase in the production of livestock and the output of the meat processing industry in Manitoba by 1975 can result in an additional 13,700 new jobs being provided in agriculture, 3092 new jobs in the meat products industry, and 8360 new jobs being created elsewhere in the economy; or 50% as many jobs as in the two industries providing the initial stimulus. In other words, this input-output model shows the degree to which the processing of an agricultural staple product before it is exported can serve to stimulate the economy of at least one part of the Prairie Region.

DIRECT AND INDIRECT REPERCUSSIONS OF
POTENTIAL NEW MEAT PACKING OUTPUT IN
MANITOBA, 1975

INDUSTRY	Total Output From \$1 of Final Output Meat Processing	Proportion of Output in Total Output Produced in Manitoba	Output in Manitoba from \$1 of Final Out- put Meat Packing (1 x 2)	Total Output From Expanded Meat Packing in Manitoba \$000	Employment Per \$1,000 of Output (5)	Total New Employment From Expansion (4 + 5) (6)
	(1)	(2)	(3)	(4)	(5)	(6)
1. Agriculture	.647741	.70	.453419	68,617	.200	13,700
2. Forestry	.004217	.40	.001687	275	.087	23
3. Fishing, Hunting, etc.	.001406	.80	.001125	166	.358	59
4. Metal Mining & Smelting	.001117	.10	.000112	16	.091	1
5. Coal, Petroleum, & Gas	.007218	.05	.000361	55	.043	2
6. Non-Metallic Minerals	.001081	.60	.000649	98	.104	10
7. Meat Products	1.001425	.85	.851211	128,819	.024	3,092
8. Dairy Products	.000137	.90	.000123	19	.040	.....
9. Fish Processing	.003164	.50	.001582	239	.077	18
10. Fruit & Veg. Preparation	.000008	.50	.000004	.....	.056	.....
11. Grain Mill Products	.051159	.95	.048601	7,355	.025	184
12. Bakery Products	.000014	.90	.000013	.....	.098	.....
13. Carbonated Beverages	.000001	.95	.000001	.....	.047	.....
14. Alcoholic Beverages	.000143	.40	.000057	.....	.031	.....
15. Conf. & Sugar Refining	.000803	.60	.000482	73	.049	4
16. Misc. Food Preparation	.001668	.50	.000834	126	.030	4
17. Tobacco & Its Products	.....	.00	.....	.....	.032	.....
18. Rubber Products	.006739	.00	.....	.....	.061	.....
19. Leather Products	.000348	.10	.000035	.....	.114	.....
20. Textiles (Ex. Clothing)	.005400	.20	.001080	163	.085	14
21. Clothing & Fur	.000217	.50	.000109	16	.114	2
22. Furniture	.000830	.50	.000415	62	.099	6
23. Wood Products (Ex. Furniture)	.005917	.40	.002367	358	.083	30
24. Paper Products	.009961	.60	.005977	904	.046	42
25. Printing & Publishing	.004502	.80	.003602	546	.090	49
26. Primary Iron & Steel	.005436	.00	.....	.....	.045	.....
27. Agricultural Implements	.001278	.30	.000383	58	.080	5
28. Iron & Steel Products N.E.S.	.029347	.30	.008804	1,332	.067	89
29. Transport Equipment	.014396	.20	.002879	436	.056	24
30. Jewellery & Shrinkage	.000051	.05	.000002	.....	.085	.....
31. Non-Ferrous Metal Prod.	.001892	.10	.000189	29	.028	.....
32. Electric Apparatus, Etc.	.004622	.30	.001387	210	.070	15
33. Non-Metallic Mineral Prod.	.003616	.50	.001808	274	.062	17
34. Products Petr. & Coal	.040809	.10	.004081	618	.013	8
35. Chemical & Allied Prod.	.031169	.15	.004675	708	.039	28
36. Misc. Mfg. Ind.	.001433	.25	.000358	54	.088	5
37. Transport, Storage, Trade	.208262	.75	.156197	23,638	.165	3,900
38. Communications	.006840	.75	.005130	776	.120	93
39. Utilities	.007596	.95	.007216	921	.054	50
40. Finance, Insurance, etc.	.039032	.40	.019516	2,953	.100	295
41. Service Industries	.014982	.50	.007491	1,134	.100	113
42. Unallocated	.039414	.50	.019707	2,982	.100	288

CHAPTER V

CONCLUSION

This survey confirms the theory that the exploitation of resource based staples have been an important factor in the economic development of the Prairie Region and Central Canada. Further, it lends some support to the view that future economic growth of the Prairie Region will depend on the exploitation and exportation of highly processed and manufactured staples such as dressed and cured meats and their products, in addition to the continued cultivation and exportation of the traditional staple wheat. The role of such processed staple exports is particularly critical to the future of employment opportunities in the region. The rapidly increasing productivity in the raising of wheat and other cereal grains, plus the capital intensity of some of the other newer staples in the region, such as oil and gas in Alberta, are not likely to provide sufficient job opportunities to employ the anticipated increase in the labour force in the prairies without extensive emigration.

The Introduction and Chapter I dealt with the role of staple exploitation in the economic development of the Prairie Region and Central Canada since Confederation. It was shown that during this century the secondary stimulus which export staples provided to the Canadian economy has changed somewhat from those industries supplying the needs of the staple producing areas to those industries which are supplied by the staple (i.e. those industries which process or refine the staple). The importance of processing basic staples before exportation was recognized

early in Central Canada, as evidenced by the protracted struggle to have the two major staples of that region, pulp and paper and metallic minerals, processed locally. As was indicated in Chapter II, the success of the Central Canadian region in encouraging the local processing of staple products allowed it to capitalize on its earlier position as principal supplier of manufactured goods to western Canada and its locational advantage of proximity to the major industrial area of the United States, to become the industrial heartland of Canada.

The consequences to the economy of the Prairie Region of a continued reliance on the unprocessed export staple wheat in the context of the probably future export markets for this product and the dominant industrial position of Central Canada are discussed in Chapter III. It is concluded that the prospective markets for the traditional agricultural export of wheat will not increase sufficiently to provide a basis for economic growth in the future. Such growth can only result from the increased exploitation and processing of other staple products and their export beyond the region. One example of this is the development of an industrial complex in Alberta based on natural gas and oil, which has made that province one of the fastest growing areas in the nation during the past decade. However, if the entire region is to grow to its maximum potential, similar development must take place with other staples.

As the most abundant raw materials the Prairie Region possesses are agricultural in origin, they were examined to determine whether any agricultural products could serve as the basis for a significant expansion in the export of processed foodstuffs. It was found that such a product

does exist in the form of livestock. The Prairie Region is not only capable of expanding the output of livestock, but Central Canada, the major market for meat products, will be required to import a greater portion of its needs in the future and the factors effecting the location of the meat processing industry favour its growth in the prairies. Although sufficient data were not available to determine the potential growth in the livestock and meat processing industries and to measure the effects of their expansion on the entire Prairie Regional economy, sufficient data was available to make such a measurement of the effect on a part of the Prairie Region, the Manitoba economy, which was done in Chapter IV.

The analysis of the effect of increasing livestock production and meat packing on the Manitoba economy shows that, on the basis of employment, such staple processing can have a significant effect on the growth of at least one part of the Prairie Region. The analysis shows that the production of livestock and the output of the meat packing industry both can be almost doubled in Manitoba by 1975. This will create sufficient economic activity to employ approximately 25,000 additional persons in that year who in turn will support an increase in population of some 70,000 persons. In other words, the expansion of the production of this one staple product and its export in a processed form will provide gainful employment to and economic support for approximately 30% of the total anticipated natural increase in the labour force and population of Manitoba between the present and 1975.

The forecast expansion of livestock production in Manitoba was predicated on the assumption that that province would not significantly

increase its share of the total domestic livestock supply. As the potential for increasing the output of the livestock industry and the meatpacking industry appear to be approximately the same in the rest of the Prairie Region, there is no reason to doubt that the development of this processed export staple can have a similar stimulating effect on the growth and development of the economy of the entire region. However, proof of this statement must await the accumulation of more data and further analysis.

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