

THE UNIVERSITY OF ALBERTA

EVALUATION OF A RURAL INDUSTRIALIZATION PROJECT

by

JOHN JOSEPH KISH



A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

EDMONTON, ALBERTA

FALL, 1972

ABSTRACT

Recognition of the fact that long standing disparities continue to exist among regions in Canada has prompted the Federal Government to introduce policies intended to reduce these disparities. These policies have taken several forms, one of the latest is incentive grants to industries which encourage them to locate in designated and special areas. Evaluation of the policies and decisions made due to the policies is needed to provide feedback to be used in policy changes and adjustment.

This thesis attempts to provide feedback through the evaluation of two variables: (1) the amount of underemployment existing in each Census Division of Alberta's farm sector, and (2) the effect of public funds on the decision made by Procter & Gamble Cellulose Ltd. to locate their mill in the Grande Prairie area. The methodology follows guidelines suggested in an evaluation system for regional development; a system this thesis is testing.

In this study, underemployment is considered to be similar to low labor productivity. The basic idea is that if a measurement can be made as to how much lower than some "achievable labor productivity" the labor productivity in a Census Division is, then the amount of underemployment can be calculated. The procedure involved the use of regression analysis to estimate Cobb-Douglas production functions for Alberta for 1961 and 1966. The 1966 Cobb-Douglas production function was applied to the 1966 data and the 1961 function was applied to the 1961 data.

Using this procedure, the estimates obtained show that a substantial amount of underemployment exists in Alberta's farm sector;

40 percent in 1966 and 47 percent in 1961.

In an appendix, two separate procedures were used to check the accuracy of the estimates. All three results compared very favorably. The estimated coefficients of the Cobb-Douglas production function also compared favorably with that of other researchers.

Three approaches were used to evaluate the effect public funds had on Procter & Gamble's decision to locate in the Grande Prairie area. From an analysis of the demand and supply picture for pulp, the conclusion was reached that their mill will be an integral part of the industries' process. A comparison of Procter & Gamble's estimated gross payback percentages with other firms in the industry showed a fair return could be expected on the total costs involved. With the grant deducted from the total costs, the estimated gross payback received by them will be substantially higher than for the other firms that were used for comparison purposes. The opinions of informed sources were divided on the subject; however, some felt that with the excellent quality of the wood resources in the area, the grant did not influence their decision. The conclusion was reached that the grant had no effect on their decision to build their mill in the Grande Prairie area.

ACKNOWLEDGEMENTS

The writer wishes to express appreciation to those who provided assistance in the preparation and completion of this study. Grateful recognition is extended to Dr. L.P. Apedaile for initial assistance and financial support of the study. Greatly appreciated is the valuable direction provided through the comments and suggestions of my supervisor, Dr. M.L. Lerohl.

Appreciation is also due to Mr. Clare Shier and to Mr. Ronn Bence for their contribution. For literary corrections and typing, appreciation is extended to Miss Evelyn Shapka and Mrs. Judy Riche.

In gratitude and love, I dedicate this thesis to my family: my wife, Marilyn, for her help, understanding, and encouragement; and my sons, Bradley and Scott, for the valuable distractions they provided.

TABLE OF CONTENTS

	Page
ABSTRACT	iii
ACKNOWLEDGEMENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	x
CHAPTER	
I. INTRODUCTION	1
Preamble	1
The Region	1
The Problem	10
II. THE MILL	12
History	12
Establishing the Mill	14
Employment, Training Programs, and Income	17
Timber Management Agreement	19
III. CONCEPTUAL MODEL AND LITERATURE REVIEW	21
The Evaluation Systems	21
Outline of Evaluation	25
Literature Review	29
IV. METHODOLOGY AND EMPIRICAL RESULTS	44
Criteria Variable I	44
Criteria Variable II	54
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	74
Summary	74
Conclusions	74
Recommendations	78
SELECTED REFERENCES	80
APPENDIX A. DEPARTMENT OF REGIONAL ECONOMIC EXPANSION	86

APPENDIX B. 1961 AND 1966 CENSUS DATA	90
APPENDIX C. CHECK OF DATA CONSISTENCY	101
APPENDIX D. ALTERNATIVE ESTIMATIONS OF UNDEREMPLOYMENT	106
APPENDIX E. PULP AND PAPER MILLS IN CANADA	108

LIST OF TABLES

Table	Page
1.1 Population of Alberta Census Division 15 for 1961 and 1966	4
1.2 The Percentage of the Labor Force Employed in Various Sectors for Alberta and Census Division 15	5
1.3 Volume of Wood Inventory	8
1.4 Manufacturing In Census Division 15, 1965	9
2.1 Estimates of Total Employment of Procter & Gamble Cellulose Ltd.	17
2.2 Charges and Dues Paid by Procter & Gamble to the Government of Alberta	20
4.1 Estimated Coefficients and Estimated Coefficients Obtained by Other Workers in the Field	50
4.2 Results of the Underemployment Estimation by Census Division for 1961 and 1966	51
4.3 Estimated Disposition of Wood by Region	55
4.4 Wood Pulp Production	56
4.5 Projected Production of Wood Pulp in Canada, 1975-2000	60
4.6 Canada's Domestic Demand for Forest Products	61
4.7 Canada's Exports of Pulp and Paper: 1980 and 2000	61
4.8 Comparing Projections of Manning and Pulp & Paper Magazine of Canada for 1980 and 2000	62
4.9 Analysis of Selected Pulp & Paper Companies Cash Flow, and Utilization of Property, Plant, and Equipment	66
4.10 Estimation Gross Payback for Procter & Gamble Cellulose Ltd.	67
4.11 Comparing Gross Payback Rates for the Three Selected Companies and Procter & Gamble Cellulose Ltd.	69

B.1	1961 Census Data	91
B.2	1966 Census Data	96
E.1	Underemployment Estimated From Total Value of Products Sold for 1966	109
E.2	Underemployment Estimated From Total Value of Products Sold for 1961	110
E.3	Comparisons of All the Underemployment Percentages Calculated	111

LIST OF FIGURES

Figure	Page
1.1 Population Distribution 1966 Peace River District, Alberta	3
1.2 Peace River and Adjacent Areas Showing Forest Management Units	7
3.1 Designated and Special Areas Superimposed On a Census Division Map of Alberta	28
C.1 Year Round Workers	102
C.2 Paid Female Workers	103
C.3 Total Male and Female Workers	104
C.4 Male Workers Only	105
E.1 Pulp and Paper Mills in Canada 1971	112

CHAPTER I

INTRODUCTION

Preamble

Within Canada's rapidly expanding economy, certain regions have not been able to enjoy the growth and resulting benefits experienced by their fast developing counterparts. The desire to correct this disparity has resulted in a number of deliberate public intervention programs to facilitate regional development. The institution of these programs has resulted in a need for evaluation to provide useful feedback and information which could be used in constructing future policy measures.

One such program, involving incentive grants to induce industries to locate in designated regions, has been instituted in the Peace River region of Alberta. The size of the incentive grant involved makes it imperative that evaluation be done to ascertain whether or not similar future uses of public funds are likely to be in the public interest.

The Region

The primary region of concern in this study is Census Division Fifteen, better known as the Peace River region of Alberta.¹ Census Division Fifteen is the largest of Alberta's fifteen Census Divisions.

¹For a more complete description of the region see: Research and Planning Division, Human Resources Development Authority, B-15 Plan: An Outline for Rural Development in Alberta's Census Division Fifteen (Edmonton: Human Resources Development Authority, May, 1969); and L. N. Harvey, Land, Industries and Related Factors in the Peace River District, Alberta (Edmonton: Northern Alberta Development Council, 1968). The material in this section has largely been taken from the two above-mentioned references.

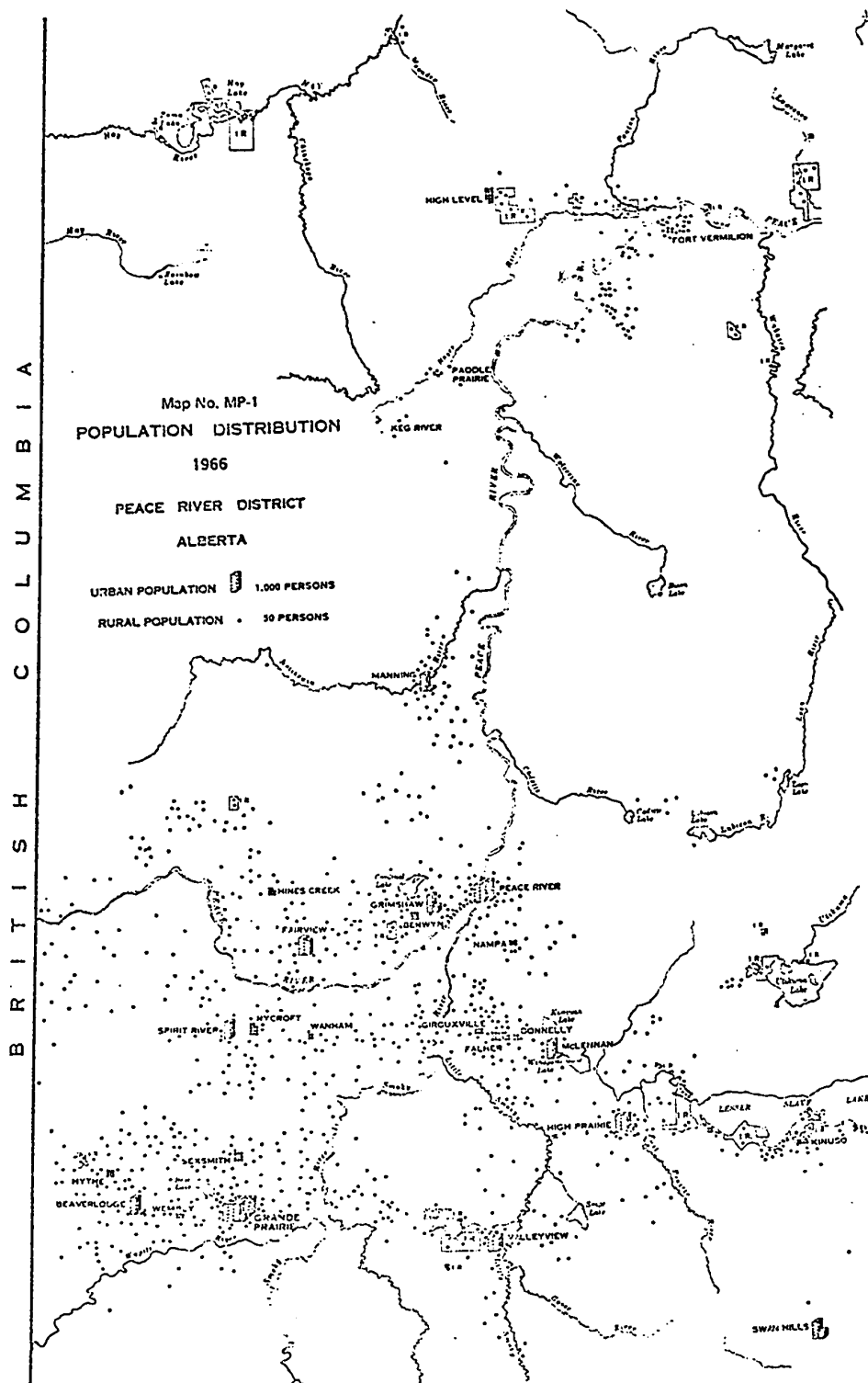
It covers approximately one-third of Alberta's area and is located in the northwestern portion of the Province. It is a region that varies considerably in topography and is still rich in undeveloped natural resources. The greatest portion of the land, particularly in the northwest, is Public Land consisting mainly of Forest Reserves.

The Peace River District, which consists of eleven municipal or improvement districts, is generally broken down into two areas: Area A, which is the older more settled Central Peace River region, comprising of Grande Prairie, Peace River and surrounding area, and Area B, which is the new developing northwestern section approximately centered on Fort Vermilion. The bulk of the population is located in Area A. Figure 1.1 shows the distribution of population throughout the area, while Table 1.1 shows the population of Alberta and Census Division Fifteen.

Table 1.2 shows a comparison of the division of labor in Census Division Fifteen and Alberta. This data indicates that the region's economy is based quite heavily on agriculture.

Agriculture is still the industry with the greatest economic importance for the Peace River District. The principal crops which are grown are wheat, oats, barley, flaxseed, rapeseed, forage seed crops, and hay. The principal livestock produced are cattle, milk cows, pigs, sheep, and poultry. Honey is also produced in the region. The forage seed crops are important to the region and large quantities are exported to Europe, Japan, United States and Argentina.

FIGURE 1.1



SOURCE: L. N. Harvey, Land, Industries and Related Factors in the Peace River District, Alberta (Edmonton: Northern Alberta Development Council, 1968), p. 10.

TABLE 1.1

POPULATION OF ALBERTA AND CENSUS DIVISION FIFTEEN FOR 1961 AND 1966

	Alberta		C. D. 15	
	1961	1966	1961	1966
Total Population	1,331,944	1,463,203	76,884	88,344
Male	689,383	746,245	41,193	46,913
Female	642,561	716,958	35,691	41,431
Increase from 1961-1966				
% Increase	131,267 10%		11,460 15%	
Urban	843,211	1,007,407	17,401	30,362
Rural	488,733	455,796	59,477	57,982
Rural Non-farm	202,910	178,198	27,396	23,830
Rural Farm	285,823	277,598	32,080	34,152
Urban as a % of Total	63%	69%	23%	34%
Rural as a % of Total	37%	31%	77%	66%
Rural Non-farm as a % of Total	15%	12%	36%	27%
Rural farm as a % of Total	22%	19%	41%	39%

Source: Data published in Dominion Bureau of Statistics, Population, Rural and Urban Distribution, 1966, Catalogue No. 92-608, Vol. 1, nos. 1-8 (Ottawa: D.B.S., March, 1968).

TABLE 1.2

THE PERCENTAGE OF THE LABOR FORCE EMPLOYED IN VARIOUS SECTORS
FOR ALBERTA AND CENSUS DIVISION FIFTEEN

	Alberta	C.D. 15
Agriculture	21.3	41.0
Logging, Fishing, Hunting, and Trapping	0.6	4.8
Mining and Related Activities	1.1	1.4
Managerial	8.5	6.7
Professional and Technical	9.5	6.7
Clerical	11.3	4.4
Transportation and Communication	5.8	4.7
Craftsmen, Production and Related Workers	17.0	12.5
Labourers	4.0	3.7
Sales Activities	6.5	4.1
Service Activities	12.1	7.6

Source: D. R. Webster, Central Places in the Peace River Region of Alberta (Grande Prairie: Peace River Planning Commission, 1971), p. 9.

The forest industries are second only to agriculture in their importance to the Peace River District economy. The prominent species are white spruce, pine, black spruce, balsam fir, and poplar. Table 1.3 shows the volume of wood inventory in Census Division Fifteen. Figure 1.2 shows the location of various forests.

The four important energy resources located in the Peace River District are coal, oil, natural gas, and potential water power. The most active of these are oil and gas. Other minerals that are available are sedimentary iron ore, silica, salt, peat moss, and sand and gravel.

Considerable construction activity has taken place in the last five to ten years. Some manufacturing is also taking place in the region; the majority of this is in the wood industries. Table 1.4 shows the manufacturing that was taking place in 1965.

Transportation facilities are increasing and being improved as the population grows. The area is serviced by air, rail, and road.

The district is provided with all types of communication services -- mail, telegraph, telephone, microwave, and news media.

Retail trade and services are expanding in the region with Grande Prairie and Peace River being the two main centers of activity.

TABLE 1.3

VOLUME OF WOOD INVENTORY			
Species		Pulpwood (4"-9" DBH)	Saw Timber 10" & DBH ^a
		Cords	MFBM ^b
Footner Lake Forest	White Spruce	13,097,900	7,087,560
	Black Spruce	3,397,340	
	Balsam Fir	449,970	76,770
	Pine	2,794,950	807,950
	Total Coniferous	19,740,160	7,972,170
	Poplar	25,336,550	8,263,610
Peace River Forest	White Spruce	6,690,000	4,300,210
	Black Spruce	2,331,000	
	Balsam Fir	613,000	131,730
	Pine	7,254,000	1,113,670
	Total Coniferous	16,838,000	5,545,610
	Poplar	20,600,000	5,343,000
Slave Lake Forest (Western Part)	White Spruce	4,077,800	2,911,400
	Black Spruce	1,007,600	
	Balsam Fir	433,800	128,600
	Pine	2,118,900	867,800
	Total Coniferous	7,638,100	3,907,800
	Poplar	10,103,400	5,474,300
Grande Prairie Forest	White Spruce	7,936,600	6,314,900
	Black Spruce	2,919,100	
	Balsam Fir	557,800	166,900
	Pine	14,946,600	3,832,100
	Total Coniferous	26,360,100	10,313,400
	Poplar	16,529,800	8,878,000

^aDBH -- diameter breast high

^bMFBM -- thousands of feet board measure

Source: L. N. Harvey, Land, Industries and Related Factors in the Peace River District, Alberta (Edmonton: Northern Alberta Development Council, 1968), p. 37.

TABLE 1.4

MANUFACTURING IN CENSUS DIVISION FIFTEEN, 1965

Industry	Estab- lish- ments	Employ- ees	Salaries and Wages	Selling Value of Factory Shipments
PRIMARY INDUSTRIES	No.	No.	\$	\$
Wood Industries (Includes Sawmills)	151	1,436	4,492,541	15,932,134
Furniture and Fixture Industry	3	3	11,373	32,571
Printing, Publishing and Allied Industries	6	77	219,363	519,025
Non-Metallic Mineral Products Industries	7	36	108,597	849,427
Pasteurizing Plants	4	30	122,204	459,309
SECONDARY INDUSTRIES				
Butter and Cheese Plants	2			
Feed Manufacturers	2			
Bakeries	7			
Soft Drink Manufacturers	2	183	775,504	3,422,219
Machine Shop	3			
Miscellaneous Manufacturing Industries	1			
Dental Laboratories	<u>1</u>	<u> </u>	<u> </u>	<u> </u>
TOTAL	<u>190</u>	<u>1,765</u>	<u>5,729,582</u>	<u>21,234,685</u>

Source: Data obtained from the Alberta Bureau of Statistics, Edmonton.
This information was compiled in October, 1967.

The Problem

One of the prime functions of the incentive grant system is to bring employment opportunities, and thus increased incomes, to a designated region. The local employment office in Grande Prairie indicated that minimal unemployment existed in the urban sector.¹ However, there is evidence of underemployment in the farm sector.²

The Government of Canada, through the Department of Regional Economic Expansion has obligated itself to give Procter & Gamble Cellulose Ltd., a large incentive grant to build a pulp mill in the Grande Prairie area. The function of the incentive grant is to induce industries into areas of lagging employment. The purpose of this study is to assess, from a rural development perspective, the effect of this expenditure on the decision by Procter & Gamble Cellulose Ltd. to locate in the Grande Prairie area and to find whether or not Census Division Fifteen is in need of special development efforts as compared to other Alberta census divisions.

¹Exact figures were not available on the unemployment rates in Grande Prairie compared to the Alberta average. Mr. John Dean, Assistant Director of the Canada Manpower Center, said in a telephone interview on August 8, 1972, that the rate was lower than the Alberta average.

²For a description of the farm situation in Census Division Fifteen, see: Research and Planning Division, Human Resources Development Authority, The B-15 Plan: An Outline for Rural Development in Alberta's Census Division Fifteen. In 1966, of the 8,868 farms in the region, only 4,224 had sales over \$2,500. The authors of the plan estimate that by 1981, if labor is to be fully employed, there should only be 4,989 farms in the area. This is a decrease of 3,879 farms; however, the authors feel that possibly only 1,300 will disappear. Thus, they felt that underemployed farm units are expected to continue in the area.

Therefore the prime objectives of this thesis are the following:

(1) Estimate the amount of underemployment existing in each census division of Alberta. This measure will then be used to indicate whether or not the rural areas of Census Division Fifteen can provide the necessary manpower to meet the requirements of the new Procter & Gamble Cellulose Ltd. Pulp Mill. It will also be used to indicate whether or not the Grande Prairie area is in need of special development efforts.

(2) Examine the situation in the pulp industry and that of Procter & Gamble Cellulose Ltd. to ascertain the effect public funds had on their decision to locate in the Grande Prairie area.

(3) Apply and operationalize an evaluation system for regional development.¹ The analysis in the thesis will follow, as closely as possible, the suggested guidelines laid down by the evaluation system.

¹L. P. Apedaile, V. Matthews, and L. Stewin, An Evaluation System for Regional Development (Edmonton: University of Alberta, 1971).

CHAPTER II

THE MILL

History

Until January 1, 1965, the policy of the Alberta Government was to grant sole exploratory rights for a reasonable time to one company interested in developing a pulp mill. It was felt that this policy may have hampered the possible development of pulp mills; therefore, effective January 1, 1965, the requirements became: (a) proven financial and management ability to construct a pulp mill and (b) evidence that the group can market the pulp production.

During the period October, 1966 to February, 1967, the Government advertised the availability of the Grande Prairie and Rocky Mountain House areas. The final date for the receipt of proposals for the Grande Prairie area was July 1, 1967. Two proposals were received -- one from McIntyre Porcupine Mines Limited and one from the Procter & Gamble Company.

The Government decided to review these two proposals at a public hearing on October 27, 1967, in Grande Prairie. The meeting was to allow the two companies to publicly present their intentions and to permit representation from other persons or organizations outlining the beneficial or detrimental effects of such an industry.¹

¹ Alberta Department of Lands and Forest, Summary: Public Hearing on Proposed Pulp Mill Development in the Grande Prairie Area, October 27, 1967, p. 2.

At this point in time, three companies were negotiating with the Alberta Government. The two mentioned above were in competition for the Grande Prairie Forest, while the third, MacMillan Bloedel, had already secured a lease in the Whitecourt area.¹

In December, 1967, the Provincial Government announced that Procter & Gamble Cellulose Ltd. had been selected as the company with which to negotiate regarding the Grande Prairie pulp mill project.² Several factors entered into the decision which resulted in the choice of Procter & Gamble Cellulose Ltd. over McIntyre Porcupine Mines. The January 19, 1968 issue of Pulp & Paper Magazine of Canada had the following comments:

An Alberta Government spokesman said Procter & Gamble's wide experience in pulp and paper was a factor in its selection over McIntyre Porcupine. Also, the U. S. company will have a captive market for products produced at the mill.

Other factors which favored Procter & Gamble's proposal included its willingness to pay higher stumpage dues and the fact it required a smaller leasehold area.³

¹As mentioned, MacMillan Bloedel had already secured a lease in the Whitecourt area, which was designated a Special Area early in 1970. According to a personal interview with Mr. Jerry Bigam, Economist, who at that time was employed with HRDA and was instrumental in the Lesser Slave area being designated, MacMillan Bloedel submitted an application for an incentive grant which was subsequently approved. However, MacMillan Bloedel still decided not to build. Some of the reasons cited by Mr. Bigam were that MacMillan Bloedel was facing financial problems and could only obtain money at about 12 percent. At that time the Canadian dollar was also allowed to float and it moved upward in relation to the U.S. dollar, which meant that MacMillan Bloedel's previously shaky position was now even more insecure. Another problem at that point in time was that the outlook for pulp was uncertain and MacMillan Bloedel, unlike Procter & Gamble, had no large captive market but would have to sell most of their pulp on the world markets. This combined with the increased value of the Canadian dollar put them into a high-risk position financially.

²Procter & Gamble Cellulose Ltd., Fact Sheet (Grande Prairie: Procter & Gamble Cellulose Ltd.)

³Pulp and Paper Magazine of Canada, 19 January, 1968, p. 7.

On December 10, 1970, after special provisions were made to extend the boundaries of the Lesser Slave Lake Special Area to include Grande Prairie so Procter & Gamble Cellulose Ltd. could qualify for an incentive grant, the Honourable Jean Marchand, Minister of Regional Economic Expansion, announced an estimated \$11,790,000 grant to assist in the construction of a bleached kraft pulp mill.¹ The new mill, which would open up more than 800 new jobs for the people of Northwestern Alberta, is now under construction and is slated to go into production approximately July, 1973.

Establishing the Mill

Procter & Gamble Cellulose Ltd., a new Alberta Company with headquarters in Grande Prairie, will operate the Grande Prairie mill and its accompanying woodlands operations. The mill is owned and built by The Procter & Gamble Company of Canada, Limited. Both companies are subsidiaries of the Procter & Gamble Company, an international firm headquartered in Cincinnati, Ohio.²

The Product

The mill, which is located eight miles southeast of Grande Prairie, north of the Wapiti River, will produce about 250,000 tons of bleached kraft pulp annually.³ Kraft pulp is produced using a sodium sulfate process. This process leads to an improvement in the rate of pulping and the quality of the pulp. The pulp thus obtained is of brown

¹Canada Department of Regional Economic Expansion, News Release, 10 December 1970, 11:30 A.M. E.S.T. Appendix A contains a short description and discussion of the Department of Regional Economic Expansion.

²Procter & Gamble Cellulose Ltd., Fact Sheet.

³Ibid.

stock or fibers and has greater strength than other methods would produce. However, bleaching is needed to remove the brown color and produce a white, fine grade of pulp. The pulp goes to Eastern Canada and the Eastern U.S.A. where about 60 percent of it will be processed into disposable diapers (sold under the trade name of Pampers). The balance of the pulp will be sold on world markets.¹

The Plant

As was previously mentioned, the mill is located eight miles southeast of Grande Prairie. This site selection means that there will be approximately a forty mile log haul. However, the Company selected this site because a new company town will not be needed since Grande Prairie is so close and has all the facilities. Also, at this site the water supply suits their requirements best.

Construction is being carried out by Canadian Bechtel Ltd., Toronto, working with Sandwell & Co. Ltd., consulting engineers who designed the project. A Mill Model, built and designed in Montreal and the largest of its kind in the world, will be used to help build the mill. Assembled, the model is over twelve feet high and more than fifteen feet long. It duplicates in scale (three-quarters inch to the foot) the pulp production area from digesting through bleaching, an area of about 55,000 square feet or one and one-quarter acres.²

¹Eric Jerrard, Public Relations Officer for Procter & Gamble Cellulose Ltd., Private interview, Grande Prairie, June 26, 1972.

²"Procter & Gamble Alberta Mill Underway," Pulp & Paper, May, 1972, p. 7.

Some of the mill facilities included are a woodyard, pulp making machine, warehouse, shipping and office space, water treatment facilities, maintenance shops and boiler house. From one end to the other the mill will stretch more than 1,800 feet.¹

The Wapiti River and atmosphere surrounding will be protected by extensive pollution control facilities. The cost of these facilities is expected to be in the neighborhood of \$8,000,000.²

The following quotation from Pulp & Paper describes the pollution control equipment:

The air protection measures planned are believed to be as extensive as any installed in a North American kraft mill. Odor control will include a "reduced odor" recovery boiler system. Odorous gases from the mill's digester, evaporators, washers and black liquor storage tanks will be incinerated. Any odors from the mill's normal operations will rarely, if ever, be detected as far as Grande Prairie, eight miles from the mill site.

Particulate emissions from the mill's combination bark and natural gas boiler will be collected by using cyclone collectors which operate at 85% efficiency. An electrostatic precipitator, rated at 99%+ efficiency, will collect particulate matter from the recovery boiler.

Internal processes will reuse water many times over to reduce the volume of water used, thus reducing the amount of waste water. Before construction began, extensive studies were made of the Wapiti River, on which the mill is located. A waste treatment system was designed that would provide maximum protection for the stream.

BOD materials will be removed in a large waste treatment system which includes both primary and secondary treatment. Primary treatment will be accomplished in a large circular clarifier. Secondary treatment will be carried out in two large aerated lagoons. In total, the system provides for an 80-90% removal of BOD material. A special settling area following the biological treatment section will collect the solids produced in secondary treatment and prevent them from entering the river.

¹Procter & Gamble Cellulose Ltd., Fact Sheet.

²Jerrard, Interview.

Unusual waste loads will be intercepted and held in specially designed bins or tanks.¹

In addition to the above facilities, Procter & Gamble Cellulose Ltd. will build an extensive network of roads throughout the area. The cost of these roads is expected to be in the neighborhood of \$12,000,000 to \$15,000,000. Campsites will also be built in various parts to promote recreational use of the area.²

Employment, Training Programs and Income

Procter & Gamble Cellulose Ltd. will be one of the largest employers in the region. It is hoped that the majority of employees will be residents of the Peace River region. The following table shows the break-down of the estimated employment.

TABLE 2.1

ESTIMATES OF TOTAL EMPLOYMENT OF PROCTER & GAMBLE CELLULOSE LTD.

	Professional	Technical	Trades	Semi Skill-Skill- ed	Non Skill-Skill- ed	Total
Manufacturing	55	74	122	91	31	373
Forestry	49	6	38	147	87	327
Total Procter & Gamble Employ	104	80	160	238	118	700
Log Hauling					143	143
Grand Totals	104	80	160	238	261	843

Source: Procter & Gamble Cellulose Ltd., "Estimated Organization Summary, "Grande Prairie, 1970. (Mimeographed).

¹"Procter & Gamble Alberta Mill Underway," Pulp and Paper Magazine of Canada, p. 7.

²Jerrard, interview.

An interview with Mr. Eric Jerrard¹ indicated that almost all the employment will be Canadian. Approximately twenty Americans will be on hand to start the project, fifteen of these are expected to return to the U. S. in the first five to ten years. As Canadians are trained, they will replace the returning Americans.

It is expected, with the type of logging operations carried out, that nearly all the employment will be year around, with very little part-time or seasonal employment. It is now also expected that all workers will be employees of Procter & Gamble Cellulose Ltd. and that no contract work will be let out.

No educational levels or skill requirements are stipulated. Procter & Gamble Cellulose Ltd. expects to train all their employees for a three to five month period before going on the job. For example, if welders are needed, they will train their own welders. This will enable people from the region with an aptitude for a certain job, but little education and no technical training, to obtain a good job and also acquire the necessary training. The employees will also be able to gain training in other areas if they so desire.

Although they will have no rigid hiring priorities, they will attempt to give preference to people from the Peace River region, than Albertans and Western Canadians. They will have their own personnel office and will also work with the Canada Manpower Offices to obtain the necessary staff.

¹Ibid.

The estimated annual payroll is expected to be approximately \$7,000,000, and it is expected that most of this will be spent in the Grande Prairie area.

During the construction phase of the mill, employment levels may exceed 1,600 people. These people are employees of Canadian Bechtel, which hires through the national unions. Therefore, the employment impact on the region is not significant. However, their estimated monthly payroll is \$1,000,000 with about 50 percent of this being spent in the Grande Prairie area. When the mill begins operations in July of 1973, this impact should remain about the same. This means that one-third of the total Grande Prairie income will come from the mill.

The Local, Provincial, and Federal governments will also benefit. The mill is expected to double the present \$13,000,000 assessment of the County of Grande Prairie.¹ It is expected that \$25,000,000 will be spent annually in Alberta for goods and services.² The benefit for Canada has not been estimated as yet.

Timber Management Agreement

On January 3, 1969, the Timber Management Agreement between The Procter & Gamble Company of Canada and the Government of Alberta was signed. This agreement describes the practices that must be followed by both parties in the Timber Management Area. It also states the annual charges that Procter & Gamble Cellulose Ltd. must pay the Provincial Government. The following table shows these charges and dues.

¹Ibid.

²Don Sylvester, "Maybe Next Year Is Here," Alberta Business Journal, (March, 1972), p. 9.

TABLE 2.2

CHARGES AND DUES PAID BY PROCTER & GAMBLE TO THE GOVERNMENT OF ALBERTA

Charge	Due
Annual Holding Charge	\$ 3.00 per sq. mile
Forest Protection Charge	\$12.80 per sq. mile
All Coniferous Species	\$ 1.15 per cord
Old Deciduous	\$.50 per cord

Source: Alberta Department of Lands and Forests, The Forest Act, 1961,
Forest Management Agreement with the Procter & Gamble Company
of Canada, Ltd., 1969.

CHAPTER III

CONCEPTUAL MODEL AND LITERATURE REVIEW

The Evaluation System

One of the objectives of this thesis is to apply and operationalize an evaluation system for regional development.¹ The system was developed to provide a means of sensitizing an on-going program to changing sociological, political, economic, and technical conditions, and to ensure appropriate modifications of the initial proposals. It is designed to require a minimum amount of data and statistical sophistication. Once the framework has been established, the evaluation system can be carried out in a quasi-clerical manner and in more than one intervention region.

The evaluation system has nine basic objectives that must be met. These nine objectives are:

- (1) To provide documented performance feedback into the development process.
- (2) To provide documented feedback about the relative merits of individual projects within a development intervention.
- (3) To provide data-based evidence as a foundation for the feedback.
- (4) To provide timely information to those organizations responsible for decisions in the intervention process.

¹Apedaile, An Evaluation System for Regional Development.

(5) To provide this information in a meaningful form to the various decision makers.

(6) To provide development measures which are sufficiently sensitive to changes within the gestation period to enable adequate prediction of the payoff.

(7) To minimize data needs subject to conditions of statistical reliability.

(8) To provide for transferability of the system from intervention to intervention.

(9) To be routine in the application of the system so that a minimum of expertise is required to attain the prior objectives.

The evaluation system is a positioning of elements within a dimensional domain. The usual dimensions are time and space; others can be included (for example, in a regional development program -- employment, income, and inflation). The structure of the system can be analyzed by considering the members in direct juxtaposition. In other words, the relationship between members is analyzed and explained. This includes the notion of analysis of causes. The proposed evaluation system, then, is a process of explanation in which analysis of causes is selectively applied to relationships grouped as subtypes or subsystems. A subsystem may be a cause (development project) and an effect (developmental success).

Alternately, the subsystems may be identified as connections of development success criteria, along with environment factors exogenous and causal factors endogenous to the intervention. The evaluation system presented here is based on a taxonomy which differentiates subsystems according to a success criterion. Each subsystem includes endogenous

and exogenous factors to the system and analysis of the subsystem should determine the organization of these factors with respect both to each other and to the success criterion. The subsystems are dimensionally linked together.

If success criteria identifying the subsystems have been suitably defined, the evaluation system may be summarized in terms of the following phases.

For Phase I:

(1) Obtain statistically unbiased measures or estimates of the variable(s) comprising the success of performance criteria.

(2) Obtain comparison basis for the criteria variables by rotating their time and/or space dimension.

(3) Document the congruity or incongruity of the criteria measures through the dimensional domains.

(4) Infer statistical relevance to the congruity.

For Phase II:

(1) Establish the dimensional domain for the factors exogenous to the intervention.

(2) Establish the dimensional domain for the factors endogenous to the intervention.

(3) Rank all factors in descending order of their pair-wise relationship to the criteria variables according to an aprioristic estimate of the probable intensity of causality.

(4) Select a probability threshold (although arbitrary, it should be at least 50 percent) and document the actual relationship with aprioristic probabilities greater than this threshold.

(5) Specify documentable linkages through time/or space with other subsystems in terms of the secondary impact on the criteria variables vis-a-vis a particular subsystem.

(6) Infer policy alternatives on the basis of documented and/or other validated causalities capable of producing desirable values for the criteria variables.

(7) Separate the policy alternatives into relevant existing jurisdictional domains defined as clients from outside the evaluation system.¹

Criteria Variables

The criteria variables are defined qualitatively and include those economic, social, and psychological variables which demonstrably reveal the success of developmental programs. The criteria variables and the planned targets link the evaluation system to the developmental intervention. Once the criteria variables are identified, quantitative measurements may be undertaken. At least two independent measures must be made: one in the time and space dimension relevant to the intervention program, the other in an independent time and space dimension to provide a basis for comparison.

The interrelationships of the criteria variables may be mathematically defined to provide indices for change in economic and social variables. These indices would summarize the qualities of the criteria variables. The final index would compile all criteria variables into one score of economic and social change.

If possible, inference by statistical or other means from interrelationships among criteria variables and from comparisons with

¹Ibid., pp. 1-9.

base measures could be drawn.

In an open system, many forces may act upon the criteria variables; therefore, it is important to identify the unique contribution of the development program. This identification requires that the relative impact of other factors be statistically controlled while the contribution of the development program is determined.

Outline of the Evaluation

Even before attempting to apply the system to this particular research, two significant problems arise.

(1) As can be seen from the brief summary of the evaluation system presented in this chapter, it is designed to include economic, social, and psychological criteria variables. The social and psychological variables are beyond the scope of this thesis. Therefore, only economic criteria variables will be used.

(2) The second problem is much more significant than the first. The evaluation system was designed to look at an on-going development program and provide feedback to the administration to allow them to make adjustments in the program. An intervention program is made up of a collection of on-going projects. The problem, then, is this: there is no specific regional development program going on in Census Division Fifteen and, if there were, the Procter & Gamble Cellulose Ltd., plant could only be classified as one project within the program. Also, the plant is under construction and the incentive grant has been committed, thus there are no changes that can be made.

The combination of these two problems means that the system cannot be fully applied or tested. However, the methodology followed will be laid out in the framework of the evaluation system.

Before evaluation can proceed, the goals of the project must be defined. If there are no stated goals, then these goals must be developed from other indicators. The primary purpose of the incentive grant system is to create jobs in areas of lagging employment. Thus, the main essence of one of the goals should be employment.

As shown in Chapter II, Procter & Gamble officials estimate that over 800 new jobs will be created and that most of these positions could be filled from persons residing in Census Division Fifteen. The problem at this point in time is that the mill will not begin operation until July, 1973, which means that it will not be known until after that date whether or not the manpower came from Census Division Fifteen. However, it is important to know whether this region is capable of providing the necessary manpower. Therefore, one goal of this evaluation will be to ascertain if the required people are available for work from Census Division Fifteen and, because this thesis is concerned with rural development, whether or not these people can be supplied from the farm sector.

Regional development is stimulated by various methods. One method is through the use of public funds as incentive grants to induce industries to locate in the desired region. The question arises whether public funds so used are being put to the best possible use. As stated earlier, Procter & Gamble Cellulose Ltd. will receive almost \$12,000,000 dollars in public funds as an inducement to have them locate their pulp mill in the Grande Prairie area. The second goal of this thesis, therefore, will be to assess whether or not public funds were needed to induce them to locate in the Grande Prairie area.

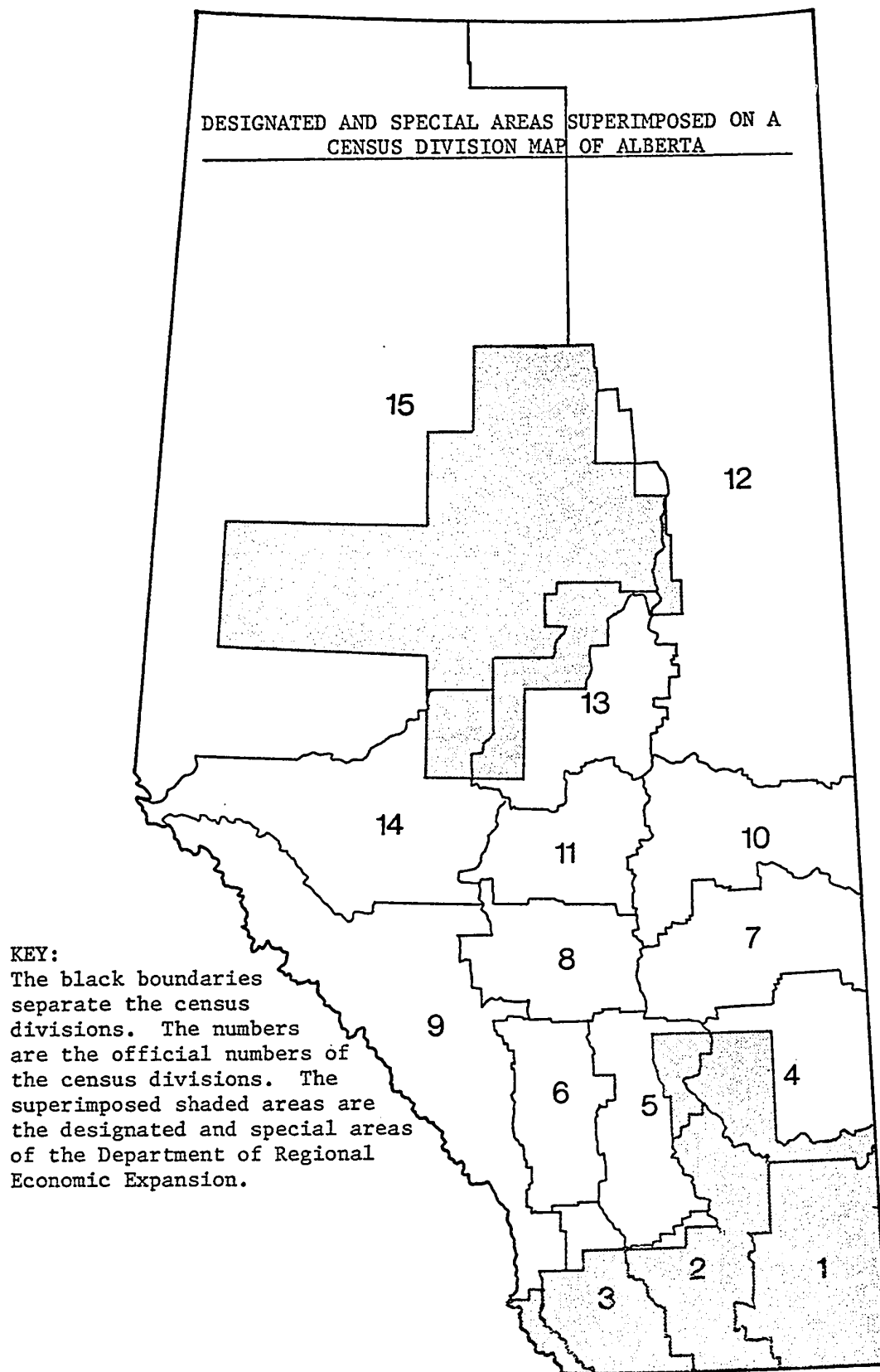
Regional development should also strive to develop those regions that provide the least opportunities for economic and social development to their residents. The Department of Regional Economic Expansion has designated several areas in Alberta (see Figure 3.1) in which incentive grants will be provided to industries for developmental purposes. The regions selected are supposedly those with the least opportunities available to the people. Therefore, a third goal of this evaluation will be to ascertain from a rural development perspective whether Census Division Fifteen is in need of special development effort.

In order to see if these goals or targets can be reached, criteria variables must be developed. The criteria variables are affected by endogenous and exogenous factors. For this particular thesis the criteria variables will be as follows:

- (1) The amount of underemployment existing in Census Division Fifteen's farm sector. This will be used to indicate success or failure for goal one and whether or not Census Division Fifteen is in need of special development effort. The amount of existing underemployment is affected endogenously by the amount of labor, capital, and land in the region, as well as outside or off-farm employment opportunities, to name a few. The same factors affect it exogenously.

- (2) The need for public funds to induce Procter & Gamble Cellulose Ltd. to locate in the Grande Prairie area. This is affected endogenously by such things as the need for new jobs in the area, location of resources in the area, and exogenously by the isolation of the area, Government policy, world pulp markets, and location of the same quality resources in other areas.

FIGURE 3.1



Literature Review

Underemployment

Much controversy has taken place in the literature over the concept of "underemployment" or "disguised unemployment". The majority of authors are concerned with the problem as it applies to underdeveloped countries, but a few have dealt with the topic as it pertains to developed countries. Underemployment has been defined by Schultz as being:

...underproductive employment, resulting in lower earnings per person than could be obtained elsewhere. In agriculture the combination of resources involves too much labor and often little capital. Thus, farm labor does not produce as efficiently as it could in other lines of work and its earnings are low relative to earnings of non-farm workers.¹

One of the first authors to deal with the subject was Joan Robinson in Essays in the Theory of Employment. In this work she coined the phrase "disguised unemployment"². Disguised unemployment is brought about by a decline in effective demand which reduces the amount of employment offered. A decline in effective demand is a result of the cyclical nature of the economy and it causes dismissed workers to seek employment in other, possibly inferior occupations. In these inferior occupations the workers' productivity is less than it was in their former occupations; otherwise, they would have engaged in these occupations before dismissal. The wage received by a man who remains employed by a particular industry measures the mar-

¹Theodore W. Schultz, Agriculture in an Unstable Economy (London: McGraw - Hill Book Company, Inc., 1945), p. 47.

²Joan Robinson, Essays in the Theory of Employment (Oxford: Basil Blackwell, 1953).

ginal physical productivity of a similar man who has been dismissed from it.¹ Thus, a decline in demand for the output of certain industries diverts labor from occupations in which productivity is higher to those where it is lower. The difference in productivity of the two occupations dictates the amount of disguised unemployment. Mrs. Robinson's concept is a static one because of the assumptions of fixed capital and technology.

Alfredo Navarreto, Jr. and Ifignia M. de Navarreto also deal with the concept of underemployment although they conceptualize it in the framework of an underdeveloped country. They infer that underemployment can be equated with marginal productivity equal to, or very close to, zero. Underemployment is described as a situation in which, for a given size of labor force, a certain quantity of labor can be withdrawn from one sector for use in another sector without appreciably diminishing the total output of the first sector.²

¹The term marginal product will be used a number of times in this thesis. Paul A. Samuelson and Anthony Scott, in Economics: An Introductory Analysis (2nd ed.; Toronto: McGraw-Hill Company of Canada Limited, 1967), pp. 592-596 give the following definition:

Definition: The "marginal-product" of a productive factor is the extra product or output added by an extra unit of that factor, while other factors are being held constant. Labor's marginal-product is the extra output you get when you add one unit of labor, holding all other inputs constant. Similarly, land's marginal product is the change in the total produce resulting from one additional unit of land, with all other inputs held constant - and so forth, for any factor.

The marginal product of a factor is expressed in physical units of product per unit of extra input. This is referred to as "marginal-physical-product". The dollar concept is referred to as "marginal-revenue-product".

²Alfredo Jr. Navarreto and Ifigenia M. Navarreto, "Underemployment in Underdeveloped Economies" in The Economics of Underdevelopment, ed. by A.M. Agarwals and S.P. Singh (New York: Oxford University Press, 1968), pp. 341-347.

This underemployment is mainly of two types and is largely due to lack of productive equipment. Structural or hidden underemployment becomes acute with the introduction of new techniques in primary production when other sectors of the economy fail to keep step and expansion is uneven. This type of underemployment is reflected in a desire to work at existing wage rates on the part of those who lack employment during the greater part of the year's normal working time. The second type of underemployment is that of expansion, which is due to the failure of capital, and of most complementary means of production, to increase at the same rate as the supply of labor in secondary and tertiary activities. This is typified by a city-ward migration of agricultural workers who, when they cannot find jobs, are forced to engage in activities of very low productivity.

Leibenstein also deals with the topic of disguised unemployment.¹ He explains the case where the marginal productivity of labor is positive and the wage rate is positive. This is related to the seasonal type of production process that takes place in agriculture. The entire labor force may be needed during seeding and harvesting but not during the inbetween period. Here the marginal productivity of labor is extremely low, but its marginal return may still be sufficient to maintain it at a subsistence level. The introduction of a small amount of capital would permit the elimination of a large portion of the labor force without any decrease in output.

¹Harvey Leibenstein, Economic Backwardness and Economic Growth (New York: John Wiley & Sons, Inc., 1957), pp. 58-70.

Ranis and Fei support the theory that in some underdeveloped countries the agricultural sector contains some redundant labor and that, under the assumption of *ceteris peribus*, this redundant labor can be removed without a decrease in output.¹

Schultz,² on the other hand, agrees that there is underemployment in agriculture, but, if the surplus labor is drawn off, then under conditions of *ceteris peribus*, output will drop. Therefore, he rejects the theory of zero marginal productivity of labor and holds that if labor is withdrawn without any changes of consequence resulting, then output will drop.

As explained at the beginning of this section, most of the literature deals with this topic from the underdeveloped countries' viewpoint. However, much that has been said and cited is applicable to a developed country. Underemployment in a developed country can arise from a number of causes.

The lack of effective demand, as discussed by Robinson, forces people to stay in less productive areas of work. This would also mean that fewer people would migrate off the farms and a system of work sharing would develop. In other words, the work would be more labor intensive than need be or more busy work would be done.

The seasonal nature of agricultural production can also induce underemployment. During peak periods everyone is employed while in off periods idle hours are again filled by busy work.

¹Gustav Ranis and John C. H. Fei, "A Theory of Economic Development," American Economic Review, Vol. 51 (September, 1961), pp. 553-558.

²Theodore W. Schultz, Transforming Traditional Agriculture (New Haven: Yale University Press, 1964), pp. 53-63.

The following definition of underemployment by C.E. Bishop (which agrees with Schultz's definition presented at the beginning of this section) probably best describes our situation.

Labor is underemployed in agriculture when the marginal real return for labor in agriculture is less than the marginal real return received for comparable labor in other areas.¹

In another article, Bishop gives the reasons for this underemployment. The three he cites are the following:

(1) Capital is not available to finance the transfer of labor among uses.

(2) People in agriculture do not know of the opportunities for employment of labor in higher paying uses.

(3) Alternative jobs simply are not available at the prevailing wage, that is, there is rationing of jobs which prohibits labor from transferring fully among industries.²

Schultz contends underemployment is predominantly due to growth and therefore lags in adjustment. It is one of the disequilibria caused by economic growth and he believes it can persist for decades.³

For the purposes of this study, underemployment is equated with low labor productivity. Agricultural laborers are unable to transfer to occupations in which they can increase their productivity at a sufficient rate. Nor is sufficient capital available to the low productivity

¹C.E. Bishop, "Underemployment of Labor in Agriculture," Journal of Farm Economics, Vol. 36 (May, 1954), pp. 258-272.

²C.E. Bishop, "Problems of Raising Incomes of Low Production Areas of Agriculture," Journal of Farm Economics, Vol. 42, Part 2 (1960), pp. 1196-1206.

³Schultz, Transforming Traditional Agriculture, pp. 56-57.

segment of agriculture to enable them to reorganize their resources such that their average marginal productivity is equal to the average marginal productivity achieved in the efficient segment of agriculture. This low productivity is reflected in the low incomes received.

Regional Development

The mainstream of literature dealing with economic development has been primarily concerned with national development, usually with the national development of an underdeveloped country. However, developed countries also have their problems. The dynamism of a developed country's economy has often been characterized by growth in some sectors paralleled by stagnation or even decay in others. This is caused by an uneven distribution of resources and economic activities, as well as the existing social and psychological structures within a nation.

Generally these subsectors or areas are:

typified by their distance from viable and growing centers of major economic activity and by their dependence on a resource base which is in the process of being depleted or which, because of changing technology, can support only a much reduced work force.¹

In Canada, according to the Canadian Council on Rural Development, the majority of these areas are rural.²

The Economic Council of Canada defines regions by provincial boundaries and subregions by internal provincial divisions because a

¹L. E. Poetschke, "Regional Planning for Depressed Rural Areas - The Canadian Experience," Canadian Journal of Agricultural Economics, Vol. XVI, No. 1 (1968), p. 8.

²Canadian Council on Rural Development, Rural Canada 1970: Prospects and Problems, Third Report and Review (Ottawa: C.C.R.D., 1969).

uniquely defined set of regions cannot be specified in a way which meets all possible requirements.¹

Chernick states:

The central task in defining a region is to delineate a geographic area that displays a relatively high degree of homogeneity and internal interdependence in respect to one or more attributes that are considered important and which thereby differentiates it from other regions. In other words, the similarities within a region should outweigh the differences, and the degree of interdependence among economic units should outweigh conflicts of economic interest. Among the many attributes commonly employed in delineating regions are physical features, resources, structure of economic activity, market size and structure, past and potential economic performance, administrative jurisdiction, and even social and cultural features.²

The Economic Council of Canada in its Fourth Annual Review and Sixth Annual Review has delineated five economic goals for Canada. One of these goals is "an equitable distribution of rising incomes".³ One aspect of this broad goal is an "improved regional balance" which means both the narrowing of inter-regional income disparities and the full and efficient use of available resources in each region. The authors of the Review point out that:

Differences in both the levels of economic and social well-being and in economic opportunity among the various regions and provinces in Canada are large, and have persisted with only modest change for

¹Economic Council of Canada, Towards Sustained and Balanced Economic Growth, Second Annual Review (Ottawa: E.C.C., December, 1965).

²S. E. Chernick, Interregional Disparities in Income, Staff Study No. 14 (Ottawa: Economic Council of Canada, August, 1966), p. 3.

³Economic Council of Canada, The Canadian Economy From the 1960's to the 1970's, Fourth Annual Review (Ottawa: E.C.C., September, 1967) and Perspectives 1975, Sixth Annual Review (Ottawa: E.C.C., September, 1969).

over 40 years....There is little reason to suppose that the historical mix of market forces and public policy is likely to lead in good time to a significant reduction in these disparities.¹

The persistence of these imbalances makes it imperative that policies be developed to help achieve a better regional balance. The Economic Council believes that these imbalances should be remedied in two interrelated ways:

...by accelerating the growth of productivity in lagging regions, and by assuring the fullest and most efficient use of each region's human and material resources.²

Therefore, the problem is how best to reach these goals. Many theories have been developed and many policies have been enacted. Rodwin feels that development policy should be concerned with where growth should be encouraged and on what scale. He says that:

...if development policy were to be guided by the principle of comparative advantage, regions, like countries, would import the things they could buy more cheaply and sell what they could produce at a lower cost.³

Chenery believes one would have to make:

...an explicit analysis of the growth process itself before it is possible to determine, even theoretically, where comparative advantage lies; market prices and current opportunity costs are no longer sufficient.⁴

The growth economists agree that:

...investment prospects will hinge on the effects of the expansion of the leading sectors on complementary or

¹Economic Council of Canada, The Challenge of Growth and Change, Fifth Annual Review (Ottawa: E.C.C., September, 1968), p. 141.

²Ibid., p. 142.

³Lloyd Rodwin, "Choosing Regions for Development," Regional Development and Planning, ed. by J. Friedmann and W. Alonso (Massachusetts: M.I.T. Press, 1964).

⁴Hollis B. Chenery, "Comparative Advantage and Development Policy," American Economic Review, Vol. 51 (March, 1961), p. 20.

related sectors, and of the sequence in which the patterns of expansion occur over time.¹

The policy recommendations of these economists diverge at this point and may be roughly divided into two major groups. Rodwin summarizes these as being:

...those assuming an elastic supply of capital and labor, who stress 'balanced growth' or the simultaneous expansion of a number of interrelated sectors; and those, assuming inelasticities of capital, managerial ability, technological innovations, etc., who argue in favor of concentrated and sequential growth patterns to achieve economies of scale and significant initial breakthrough which will induce further development.²

The Economic Council of Canada accepts as its conceptual framework balanced development among the separate regions comprising the national economy. This implies that adequate account has been taken of such factors as location, physical area, dimensions of space, and other broad geographic characteristics.³

Many factors play a role in regional development. Perloff and Wingo, in discussing the role of resources in regional development, point out that regional growth has typically been promoted by the ability of a region to produce goods and services demanded by the national economy and to export them at a competitive advantage with respect to

¹Ibid., p. 20-22. The following also agree: R.E. Caves, Trade and Economic Structure (Cambridge: Harvard University Press, 1960); A.O. Hirschman, The Strategy of Economic Development (New Haven: Yale University Press, 1958); and W.W. Rostow, The Stages of Economic Growth (Cambridge: Cambridge University Press, 1960).

²Rodwin, "Choosing Regions for Development," p. 43.

³Economic Council of Canada, Towards Sustained and Balanced Economic Growth, Second Annual Review, p. 99.

other regions. The exports induce a flow of income into the regions which, through the multiplier effect, expands the internal markets of the region for both national and regional goods and services. The size of the multiplier is related to internal features that characterize the economic and social structure of the region. Some of these internal features are related to the nature of the export industries and to the localized industrial linkages.¹

They also make the distinction between a "good" and a "poor" resource for regional development. A good resource is one that is able to support an extensive or large stream of nationally desired production. Attention must be given to the characteristics of the national demand curve for the resource and the relationship of the region's supply conditions to those of other regions. They say that:

...the demand for the resource must be derived from final and intermediate demand sectors of the national economy exhibiting a high income-elasticity of demand. Secondly, production of the resource must be characterized by extensive locationally-associated forward and backward linkages, and, finally, the resource must be characterized by a high regional multiplier; that is, a substantial proportion of the returns from the export sector must find its way into active demand for regionally produced goods and services.²

Using the above criteria, a poor resource would be one with a poor potential for producing growth.

Eric E. Lampard points out that modern economic development has occurred chiefly in the urban industrial matrix. Some of the reasons for this are as follows:

¹Harvey Perloff and Lowdon Wingo, Jr., "National Resource Development and Regional Economic Growth," in Regional Development and Planning: A Reader, ed. by J. Friedmann and W. Alonso (Massachusetts: M.I.T. Press, 1964). pp. 225-239.

²Ibid.

(a) The location theory which states that:

The optimum location for any enterprise is determined by striking a balance of all possible sites in terms of difference to be achieved in operating costs (including site rents) plus differences in transfer costs. A rational choice of site should represent the most advantageous locus for the given type of activity in the light of all existing business conditions and prospects. Similarly, consumers should locate themselves so as to minimize the proportion of their income spent in the 'consumption' of transport services and other 'distance' inputs. Thus, if all producers and all consumers were located in one place, maximum efficiency of location would be achieved; no resources¹ or effort need be devoted to surmounting disutilities of space.

The urban center offers an array of scale economies; for example, better transfer facilities, broader and more flexible labor markets, numerous services, utilities, and police and fire protection. All these attract growth.

(b) The urbanization of economic activities tends to facilitate progress from which important external economies can arise.

(c) As economic progress caused cities to grow, tertiary activities expanded more rapidly. These activities take less capital and relatively more labor, thus creating increased demand for labor.²

In Canada, a variety of federal, economic and social policies have been in effect to promote regional development. During the early years of confederation the emphasis was on national economic development. The goal was to develop a unified economy (held together by regional specialization and east-west trade) in which all regions would share in

¹Eric E. Lampard, "The History of Cities in Economically Advanced Areas," in Regional Development and Planning: A Reader, ed. by J. Friedmann and W. Alonso (Massachusetts: M.I.T. Press, 1964), p. 332.

²Ibid., pp. 336-342.

growth and prosperity. The key policy strategies were the opening up and settlement of the resource frontiers, the development of a cross-Canada continental transportation system, and the protective tariff.¹

The Great Depression accelerated policies emphasizing economic stability and income transfers to slow growing regions. In recent times many of the traditional policies have been extended and new policies have been developed to focus on manpower resources and special regional development programs.²

Conventional policies aimed at stabilization and aiding regional balance consist of monetary and fiscal policies and regional distribution of federal development expenditures. Manpower training and mobility programs are also included.

Monetary and fiscal policies are important to the national economy to insure smooth and stable growth. However, Canada's national economy is composed of a number of very different regional economies; therefore, the impact of the national policy differs among regions. Thus, regionally discriminating stabilization policies are needed. Monetary policies are not generally considered to be flexible enough to apply on a differentiated basis among regions. Therefore, the federal authorities have concentrated largely on fiscal policies, especially on the expenditure side of the budget. Fiscal policies, however, are also restricted in their use for selective distribution. One reason is that federal expenditures are a decreasing proportion of government spending. Another is

¹Economic Council of Canada, The Challenge of Growth and Change, Fifth Annual Review, p. 143.

²Ibid., p. 143.

that the dominating proportion of federal expenditures is devoted to contractual or statutory payments which cannot easily be changed in the short run.¹

There are, however, a number of national policies particularly concerned with regional growth and development. The revenue equalization payments are intended to redistribute income to the poorer provinces so they can finance such services as education, health, and transportation. National tariff policy has been the subject of much controversy over the years. The initial intent was to establish an east-west trading relationship involving a considerable deal of regional economic specialization.²

National transportation policies were effected to promote regional growth and trade. According to the Economic Council of Canada:

They have contributed to national economic integration and they have raised the average level of income in all parts of Canada. But from a regional perspective the net effect ...has been to increase the pull towards the more highly industrialized regions of Central Canada.³

More recently, manpower development programs have been instituted. The Federal Government has given grants to the provinces to help finance higher education. Manpower programs are also directed towards reducing obstacles to mobility as well as upgrading education and training. This requires counselling and placement services, the develop-

¹Ibid., p. 147-149.

²Ibid., p. 155-156.

³Ibid., p. 157.

ment of better labor market information, and the use of financial aids to facilitate mobility. In 1966, the Manpower Mobility Program was introduced to accomplish some of these intentions.¹

Recent policies have been concerned with applied regional development programs. These programs attempt to provide a better basis for sustained employment and income growth, and they are oriented to a well defined geographic region. These programs arise because of the marginal participation of rural residents engaged in marginal farming, fishing, or forestry and of the unemployed who live in slow-growing locales. The major instrument to achieve their objectives is the direct expenditures of the funds on such things as infrastructure and influencing the location of expanding and new manufacturing establishments. They are designed to raise the average level of incomes by developing and rationalizing the use of natural and human resources.²

The establishment of the Department of Regional Economic Expansion is the latest Federal Government effort to promote regional development.³ Through various means it attempts to generate productive economic growth. It also recognizes the interrelationship between urban and rural development. One of the main tools of the Department is the incentive grant to help defray the capital cost of an industry.

¹Ibid., p. 164.

²Ibid., p. 165.

³For a description of the Department of Regional Economic Expansion see Appendix A. Also for a description of previous programs, see: Poetschke, "Regional Planning for Depressed Rural Areas -- The Canadian Experience," pp. 8-20.

The basic reasoning behind the inducement or subsidy programs is outlined by Gold. He states that the widespread use of these suggest that communities and regions anticipate and have received sizeable gains in employment and income for the value of the subsidies given. The assumption is that the subsidies given actually cause a significant number of recipients to invest at sites and on scales other than they would without the subsidy.

Subsidies or incentive grants, therefore, are designed to influence the size and location of an industry. According to location theory presented earlier, industries should locate at a site dictated by the resources and the markets. Often these are not in slow growth areas because the markets, and even at times the resources, are located in the fast growth areas. Therefore, incentives disrupt the economic pattern of location and the question must be asked whether or not the returns thus achieved are greater than otherwise.

An editorial in the Globe and Mail stated that "...around \$1-billion to date..." has been spent by the Department of Regional Economic Expansion in grants to industries. The editorial quotes Dr. David Springate, a researcher, as saying that often times the money is given to industries to locate in areas they planned to locate in anyway. Much of the money has been spent on automation, which decreases available jobs, or jobs are simply transferred from high growth areas to low growth areas without creating new jobs.²

¹Ronald B. Gold, "Subsidies to Industry in Pennsylvania," National Tax Journal, Vol. XIX, No. 3 (September, 1966), pp. 286-297.

²Editorial, The Globe and Mail, August 29, 1972, p. B2.

CHAPTER IV

METHODOLOGY AND EMPIRICAL RESULTS

The objectives of this thesis have been outlined in Chapter I. Analysis of the criteria variables, as outlined in Chapter III, is the route taken to meet these objectives. This chapter, therefore, contains the methodology followed, as well as the empirical results obtained from the analysis of the two criteria variables.

Criteria Variable I

The first criteria variable to be analysed is the amount of underemployment that exists in the farm sector of Census Division Fifteen. A statistical method involving regression analysis for the development of a Cobb-Douglas production function has been used.

The basic idea is centered on the productivity of labor; if a comparison can be made between the productivity of labor in a census division and some other "achievable labor productivity", then the amount of underemployment can be estimated. Therefore in this study underemployment is considered to be similar to low labor productivity. In other words, it is assumed that if the labor productivity in a census division is lower than some "achievable labor productivity", then the resources in that census division are underemployed. The problem is to decide what labor productivity to use for measurement purposes. A number of different labor productivities can be used. (For example, the average for Alberta, or the average for Canada, or the labor productivity in U.S. agriculture.) However, for the purpose of this study, the labor productivity of Census Division Five is used. Census Division Five was chosen because it had the highest labor productivity for the study years. For the remainder of the text, the labor productivity used for measurement purposes will be called "achievable labor productivity". Also, unless otherwise stated, when productivity is referred to hereafter, it will mean labor productivity and stands for the output labor ratio.

The Cobb-Douglas production function was chosen for several reasons: (1) it is relatively easy to manipulate and interpret, (2) the coefficients of the function can be interpreted as the elasticities of production with respect to inputs, (3) the coefficients can also be interpreted as indicating the relative importance of each factor as a source of difference in output among census divisions, assuming that the factors are specified correctly, and (4) it is widely accepted and used.¹

¹The Cobb-Douglas production function, which is simply an empirical hypothesis proposed to explain an empirical observation, has been used by several authors who make the assumption that a single uniform production function can be employed for all countries or regions. See: Yujiro Hayami and Vernon W. Ruttan, Agricultural Development: An International Perspective (Baltimore: The John Hopkins Press, 1971). Hayami and Ruttan use it to measure the sources of agricultural productivity differences between countries. K. J. Arrow, H. B. Chenery, B.S. Minhos, and R. M. Solow, "Capital - Labor Substitution and Economic Efficiency," Review of Economics and Statistics, Vol. 43 (August, 1961), pp. 225-250. Arrow and others come to the conclusion that the Cobb-Douglas function is an appropriate production function for agriculture. Zvi Griliches, "Research Expenditure, Education, and the Aggregate Agricultural Production Function," American Economic Review, Vol. 54 (December, 1964), pp. 961-974. Griliches uses it to estimate the effect research expenditure has on agricultural output. Jyoti P. Bhattacharjie, "Resource Use and Productivity in World Agriculture," Journal of Farm Economics, Vol. 37 (February, 1955), pp. 57-71. Bhattacharjie applies it in a study of the productivity of resources used in agricultural production in the world to obtain some idea of the relative efficiency of their use. Anne D. Krueger, "Factor Endowments and Per Capita Income Differences Among Countries," Economic Journal, Vol. 78 (September, 1968), pp. 641-659. Krueger attempts to estimate the contribution of factor endowment differentials to variations in per capita income. Earl O. Heady and John L. Dillon, Agricultural Production Functions (Ames, Iowa: 1961) and John L. Dillon, The Analysis of Response in Crop and Livestock Production (Toronto: Pergamon Press, 1966) give a good description of the general Cobb-Douglas production function, which is:

$$Y = a X_1^b$$

where "X" is the variable resource measured, "Y" is output, "a" is a constant, and "b" defines the transformation ratio when X is at different magnitudes. The coefficient "b" is the elasticity of production. The equation is estimated in logarithmic form.

The function allows either constant (b=1) increasing (b>1), or decreasing (b<1) returns to scale. The expansion path generated by it is linear, and the function is homogenous to degree one. The marginal and

The method used is a slightly modified version of one used by Hector Correa.¹ The method is as follows:

Y = Value added,

P" = Current labor productivity,

L" = Current labor force,

P = Achievable labor productivity,

l = Actual labor force required to produce Y if achievable labor productivity is attained.

$$\text{Then: } P'' = \frac{Y}{L''} \quad (1)$$

$$L = \frac{Y}{P} \quad (2)$$

The percentage of underemployment, e, can be calculated by:

$$e = \frac{L'' - L}{L''} \times 100 \quad (3)$$

average product equations are:

$$AP_i = \frac{Y}{X_i}$$

$$MP_i = \frac{b_i Y}{X_i}$$

For diminishing returns X_i , $\partial(MP_i)/\partial X_i$ must be negative. This implies b_i must be greater than zero and less than 1. Accordingly, with diminishing returns to X_i , its marginal product must always be non-negative and decreasing.

This function also assumes a constant elasticity of production E_p , over the entire input-output curve.

¹Hector Correa, "A Method for Evaluating Underemployment (The Case for Brazil)," The Indian Economic Journal, Vol. XII, No. 1 (July-September, 1964), pp. 82-86.

This states that underemployment is the percentage reduction in the current labor force required in order to obtain achievable labor productivity.

The maximum output Y for each census division, which is obtainable with the available factors of production, is given by PL ".

Data

The data used were obtained from Statistics Canada for 1961 and 1966. It was hoped that 1971 data would be available for inclusion, however this was not the case. The data are shown in Appendix B.

The farms in the census are arranged by acreage into twelve groups. For each group data were obtained on number of workers, capital, and total value of products sold. The figures for capital that were employed are those of total farm capital. Total value of products sold was used for value added.¹

Some problems were encountered in deciding which figures to use for number of workers. The census gives this data in several classifications, the breakdown of which is not the same for 1961 and 1966. The following procedure was therefore followed.

¹In the estimation of the results two figures were employed for value added. One, as mentioned above, was the total value of products sold, a second was approximately 70 percent of the total value of products sold. It was felt that this second figure might be more representative of value added. However, due to the fact that the second was simply a ratio of the first, the results were identical. Therefore, total value of products sold was used.

Three figures from the 1961 Census were used in order to obtain the final "number of workers". That is:

- (1) the number of farms,¹
- (2) the number of year-round hired workers,
- (3) and the weeks of paid and unpaid labor were divided

by fifty-two to obtain the number of workers.

For 1966 the following was used:

- (1) number of farms,
- (2) the number of year-round hired workers,
- (3) and the number of hired male and female workers.

In an attempt to check the quality of these figures, four graphs were constructed plotting various combinations. The results are shown in Appendix C.

Analysis

The first step was to estimate the coefficients of the production function by the method of least squares estimates. In order to obtain the best function and results, a number of combinations were attempted. These were: (1) individual census division production functions, using twelve observations; (2) an Alberta production function using aggregated data of the census division, again consisting of twelve observations; (3) an Alberta production function using unaggregated census division data consisting of 177 observations for 1961 and 178 observations for 1966; (4) a combined 1961 and 1966 Alberta production function using 355 observations.

¹The census only lists one operator per farm. In some cases there may be more than one operator; however, there is no way of checking the present data to know how many more.

The best results were obtained by estimating the coefficients from 178 observations for 1966 and 177 observations for 1961. Table 4.1 shows the results obtained from (3) and (4) above. Also included, for comparison purposes, are the results obtained by several other workers in the field.

The following methodology was then used to estimate the amount of underemployment. A Cobb-Douglas production function was applied to the data. The general form of the function was:

$$Y = aK^\alpha L'^\beta \quad (4)$$

where: Y = value added,
 a = constant,
 K = capital,
 L' = labor.

In the log form the function becomes:

$$\log Y = \log a + \alpha \log K + \beta \log L. \quad (5)$$

The values for a , α , and β were calculated by the method of least squares estimates.

To obtain the value of production that corresponds to PL'' it was assumed that, on the average, farms operate a capital labor ratio equal to that required to give zero underemployment in Census Division Five. This optimum ratio is called u .

Under the above assumption, the maximum volume of production \bar{Y} , that can be obtained in each census division is calculated with the formula:

$$\log \bar{y}_i = \log a + \alpha \log u + (\alpha + \beta) \log l_i \quad (6)$$

where \bar{y}_i = total value added per group of farms and l_i = total labor in the same group of farms.

Then,
$$\sum_{i=1}^n \bar{y}_i = \bar{Y}.$$

TABLE 4.1

ESTIMATED COEFFICIENTS AND ESTIMATED COEFFICIENTS OBTAINED BY OTHER WORKERS IN THE FIELD						
	Alberta 1961	Alberta 1966	Combined Alberta 1961 and 1966	Hayami ^a Q1	Hayami Q2	Griliches ^b 49-54-59
Intercept (a)	0.19202	0.5434	0.29615			
Capital Coefficient						
(α)						
Standard Error	0.75513	0.66012	0.7258	0.612	0.53	0.459
T-Value	0.04902	0.0547	0.03476			
Variation	15.41	12.07	20.88			
Labor Coefficient	0.956	0.93	0.945			
(β)						
Standard Error	0.28102	0.41894	0.32622	0.336	0.432	0.426
T-Value	0.05831	0.0693	0.04297	0.121	0.114	0.051
Variation	4.82	6.03	7.59			
Standard Error of Estimate	0.005	0.012	0.007			
F-Value	0.18489	0.21924	0.20336	0.138	0.119	0.268
R ²	2202.5	1479.9	3570.31			
Observations	0.962	0.94	0.95	0.908	0.932	0.98
Σ of Conventional Coefficients	177	178	355	38	37	
	1.036	1.079	1.052	0.952	0.932	1.278
						0.773
						0.988

^aHayami and Ruttan, Agricultural Development, p. 92-93. This information was summarized from their results. They broke capital down into several parts. Therefore the coefficient listed here is a summation of theirs. These results are based on intercountry cross-section data for the period centered on 1960.

^bGriliches, "Research Expenditure, Education And the Aggregate Agricultural Production Function," p. 966. Cross-section using thirty-nine states.

^cBhattacharjee, "Resource Use and Productivity in World Agriculture," p. 63.

To estimate the percentage of underemployment:

$$P = \frac{\bar{Y}}{\bar{L}}. \quad (7)$$

Then substitute P into equation (2) to obtain L, which is substituted into equation (3) to estimate the percentage of underemployment.

The underemployment in each census division was estimated. The 1966 production function was applied to the 1966 data for each census division, and the 1961 production function was applied to the 1961 data for each census division. The estimates thus obtained are shown in Table 4.2. Appendix D contains an attempt to check the consistency of the results.

TABLE 4.2
RESULTS OF THE UNDEREMPLOYMENT ESTIMATION BY CENSUS DIVISION
FOR 1961 AND 1966

Division	1966	1961
	Percentage Underemployment U = \$85,324	Percentage Underemployment U = \$47,517
Alberta	40	47
Census Division 1	20	5
Census Division 2	23	9
Census Division 3	30	22
Census Division 4	26	27
Census Division 5	0	0
Census Division 6	12	16
Census Division 7	23	36
Census Division 8	34	44
Census Division 9	48	54
Census Division 10	49	55
Census Division 11	53	56
Census Division 12	71	72
Census Division 13	61	68
Census Division 14	74	79
Census Division 15	66	65

As can be seen from Table 4.2, this approach suggests that a considerable amount of underemployment exists in Alberta's farm sector. Taking the analysis to the extreme: if, for 1966, the average labor productivity in Alberta agriculture equaled "achievable labor productivity" levels and if an average capital labor ratio of \$85,324 per man year would have existed, then 40 percent of the rural labor force could have been removed from agriculture without any decrease resulting in the total value of products sold. An infusion of approximately \$777,000,000 capital (or an additional 18 percent of existing capital) would have been needed to accomplish the above.

For 1966, the elasticity of capital (α) was 0.66, while for labor (β) it was 0.42. Thus, output responds much more to a given percent change in capital than to a similar percent change in labor. (A 1 percent change in capital produces a .66 percent increase in total value of products sold, but a 1 percent increase in labor only produces a .42 percent increase.) The coefficients also show that Alberta agriculture is in a stage of diminishing returns with respect to the two inputs used in this study. The sum of the coefficients come very close to 1, showing that returns to scale are almost constant for Alberta agriculture.

The initial intent of the analysis was to ascertain whether or not Census Division Fifteen's farm sector could, with the proper reorganization, supply the necessary manpower required by the Procter & Gamble Cellulose plant. The analysis indicates that the percentage of underemployment in the Census Division for 1961 and 1966 remained fairly constant at approximately 66 percent. Using 1966 figures, if the proper reorganization were undertaken, the farm sector could release over 7,000

workers. Since the total requirement of Procter & Gamble Cellulose Ltd. is estimated to be approximately 843, there seems little doubt that the necessary manpower could be supplied.

In 1966, Census Division Fifteen had a total farm labor force of 10,971 workers and a capital input of approximately \$351,000,000. This means that the average capital labor ratio per man year was approximately \$32,000. If on average this ratio was \$85,324 per man year, then approximately 66 percent of the labor force or 7,241 workers, could be removed from agriculture. This means that, for the remaining 3,730 workers operating under an average capital labor ratio of \$85,324 per man year, approximately \$318,000,000 capital input would be required, a decrease of approximately \$32,000,000.

Another goal of this thesis in relation to underemployment is to ascertain from a rural development perspective whether Census Division Fifteen is in need of special development efforts. Comparing absolute rates of underemployment, it ranks third highest and the conclusion would therefore be that it does need special effort. However, comparing changes from 1961 to 1966, it has remained fairly stable which Census Divisions One and Two have made big increases. Therefore, perhaps these census divisions would be in greater need.

As mentioned previously, this approach suggests that a considerable amount of underemployment exists in Alberta agriculture. A U.S. study, released in 1967, which made use of income data, estimated that underemployment in U.S. agriculture is approximately 37 percent.¹ The Report

¹A Report by the President's National Advisory Commission on Rural Poverty, The People Left Behind (Washington: Government Printing Office, 1967), p. 25.

of the Federal Task Force on Agriculture estimates that only one-third of Canadian farms are large enough by today's standards for long-run viability. The remaining two-thirds can be divided into approximately two equal size groups: those who are moderately well off, but for whom the future holds many uncertainties, and those who live in poverty.¹ These two references would suggest that the estimates of underemployment made in this thesis are within an acceptable range.

Criteria Variable II

The second criteria variable to be analyzed is that of the effect public funds had on the decision made by Procter and Gamble Cellulose Ltd. to locate in the Grande Prairie area. A number of different means could be employed to analyze the above criteria variable. One very simple way would be to ask the officials of Procter & Gamble Cellulose Ltd. what they would have done in the absence of the grant. It can be assumed that their answer would be that the grant was a necessary inducement, especially since their application for the grant has already been approved.

The method of analysis used in this research is to examine various aspects of the pulp and paper industry in order to draw the necessary conclusions. This will be done in three parts: (1) the demand and supply picture will be presented, (2) estimates of gross pay-back that Procter & Gamble Cellulose Ltd. may be able to expect will be made, and (3) the opinions of various informed sources will be presented.

¹Report of the Federal Task Force on Agriculture, Canadian Agriculture in the Seventies, (Ottawa: Queen's Printer, December, 1969), p. 409.

TABLE 4.3

ESTIMATED DISPOSITION OF WOOD BY REGION

ESTIMATED DISPOSITION OF WOOD BY REGION

	Annual Wood Cut percent	
<u>Atlantic Provinces</u>		
<u>Canadian Markets</u> , all uses		21.5
<u>Exports</u> , crude materials	10.4	
lumber and plywood	7.8	
wood pulp	25.0	
paper products	35.3	78.5
Total	78.5	100.0
<u>Quebec</u>		
<u>Canadian Markets</u> , all uses		40.7
<u>Exports</u> , crude materials	1.8	
lumber and plywood	9.0	
wood pulp	7.2	
paper products	41.3	59.3
	59.3	100.0
<u>Ontario</u>		
<u>Canadian Markets</u> , all uses		37.7
<u>Exports</u> , crude materials	2.5	
lumber and plywood	8.2	
wood pulp	16.7	
paper products	34.9	62.3
	62.3	100.0
<u>Prairie Provinces</u>		
<u>Canadian Markets</u> , all uses		52.9
<u>Exports</u> , crude materials	2.0	
lumber and plywood	22.9	
wood pulp	17.7	
paper products	4.5	47.1
	47.1	100.0
<u>British Columbia</u>		
<u>Canadian Markets</u> , all uses		14.5
<u>Exports</u> , crude materials	1.2	
lumber and plywood	55.7	
wood pulp	18.8	
paper products	9.8	85.5
	85.5	100.0
<u>Canada</u>		
<u>Canadian Markets</u> , all uses		28.0
<u>Exports</u> , crude materials	2.6	
lumber and plywood	28.9	
wood pulp	16.0	
paper products	24.5	72.0
	72.0	100.0

SOURCE: J.M. Fitzpatrick, A Profile of Regional Export Trade in Forest Products, Canada, 1969, Canadian Forestry Service Publication No. 1308 (Ottawa: Department of the Environment, 1972).

TABLE 4.4
WOOD PULP PRODUCTION

WOOD PULP PRODUCTION									
Year	Disolving & Special Alpha	Sulphite		Sulphate		Screenings	All Other Pulp	Total	% Change
		Bleached	Unbleached	Bleached & Semi- bleached	Unbleached				
(,000 tons)									
1908		279						363	18.5
1909		326						445	6.2
1910		370						475	4.5
1911		362						497	27.2
1912		499						683	20.1
1913		600						855	8.6
1914		645						935	13.0
1915		744						1,075	17.1
1916		827						1,296	11.5
1917		924						1,464	6.0
1918		880						1,557	9.3
1919		991						1,716	12.4
1920			110		452			1,960	-26.5
1921		1,090	139	516	194		21	1,549	28.0
1922		932	155	322	136	5		2,150	31.1
1923		1,241	147	532	219	11		2,476	-0.4
1924		1,420	190	596	226	44		2,465	11.1
1925		1,428	201	567	218	65		2,773	14.2
1926		1,622	227	615	242	77		3,230	1.5
1927		1,901	257	738	256	88		3,279	9.1
1928		1,922	289	727	263	99		4,021	-11.1
1929		2,128	305	812	276	71		3,619	-14.2
1930		2,421	325	912	265	65		3,168	-19.0
1931		2,283	293	783	188	62		2,663	10.6
1932		2,016	301	640	145		7	2,980	
1933		1,696	256	513	137		12		
1933		1,825	356	554	171				

TABLE 4.4 Continued

WOOD PULP PRODUCTION										
Year	Disolving & Special Alpha	Groundwood	Sulphite			Sulphate			All Other Pulp	Total % Change
			Bleached	Unbleached	Bleached & Semi- bleached	Bleached	Unbleached			
			(,000 Tons)							
1960		5,881	572	1,719	1,455	987	73	774	11,461	5.5
1961		5,878	684	1,730	1,616	1,081	73	717	11,779	2.7
1962		5,878	717	1,689	1,834	1,092	67	842	12,133	2.9
1963		5,850	847	1,719	2,021	1,115	87	836	12,474	2.7
1964		6,442	958	1,914	2,447	974	83	925	13,742	9.2
1965		6,989	900	2,024	2,677	1,228	85	670	14,573	5.7
1966		7,526	898	2,168	3,163	1,442	105	655	15,958	8.6
1967	434	7,249	813	2,014	3,592	1,476	67	212	15,857	- 0.6
1968	469	7,305	751	1,892	4,577	1,457	65	245	16,762	5.3
1969	500	7,680	753	2,041	5,527	1,418	67	604	18,590	9.8
Average Growth Rate = 6.3%										

SOURCE: Dominion Bureau of Statistics, Canadian Forests Statistics, 1959, Catalogue No. 25-502, Canadian Forestry Statistics, 1964, Catalogue No. 25-503, Canadian Forestry Statistics, years 1960-1969, Catalogue No. 25-202 (Ottawa: D.B.S.).

Demand and Supply

Canada cuts more than 8 percent of the annual harvest of round wood in the world. This is exceeded only by the U.S. and the U.S.S.R. The forest products industries provide 5 percent of Canada's GNP and employ 4.5 percent of the work force. About 25 percent of the paper and 48 percent of the wood products are consumed domestically.¹ Table 4.3 shows an estimate of the disposition of wood by region.

The analysis of wood pulp production is the main concern of this section. Table 4.4 shows Canada's wood pulp production from 1908 to 1969. The percentage change in total production from year to year has also been calculated. The average yearly increase has been 6.3 percent. Manning, in his publication "Forest Resources and Utilization in Canada to the Year 2000", has estimated that the pulp industry will grow about 3 percent a year until the year 2000.² Table 4.5 shows his projections of wood pulp production in Canada, 1975-2000.

As can be seen from Table 4.4, Canada's 1969 production had already reached the levels predicted by Manning for 1975.

Pulp and Paper Magazine of Canada made some projections of Canada's domestic demand for forest products and her exports of

¹"Canada's Domestic Demand for Forest Products: 1980 and 2000," Pulp and Paper Magazine of Canada, Vol. 72, No. 2 (December, 1971), pp. 21-23.

²Glenn H. Manning and H. Rae Grinnell, Forest Resources and Utilization in Canada to the Year 2000, Canadian Forestry Service Publication No. 1304 (Ottawa: Department of the Environment, 1971).

pulp and paper 1980-2000. These are shown in Tables 4.6 and 4.7.

Adding the figures for Canada's 1966 domestic consumption and exports of pulp and paper gives a total of 16,137,000 tons. Table 4.4, which contains Dominion Bureau of Statistics data, shows that Canada's production for 1966 was 15,958,000 tons. That same year, Canada imported 216,700 tons of pulp and paper.¹ Table 4.8 shows a comparison between projections made by Manning and those made by Pulp and Paper Magazine of Canada for 1980 and 2000.

TABLE 4.5

PROJECTED PRODUCTION OF WOOD PULP IN CANADA, 1975-2000.

Year	Exported As Wood Pulp	Exported As Paper	Used in Canada's Consumption of Paper and Board	Total Pro- duction ^a
		(,000) tons		
1975	5618	9,572	3395	18,585
1980	6891	10,745	4275	21,911
1985	8049	11,874	5275	25,198
1990	9058	12,962	6495	28,515
1995	10026	13,982	7705	31,713
2000	11639	14,988	8565	35,192

SOURCE: Manning, Forest Resources and Utilization in Canada to the Year 2000. ^aAbout 50,000 tons per year could be added for sales to the synthetic textile industries.

¹Dominion Bureau of Statistics, Imports by Commodities, Catalogue No. 65-007 (Ottawa: D.B.S., 1969.)

TABLE 4.6

CANADA'S DOMESTIC DEMAND FOR FOREST PRODUCTS

Product	Units	Actual 1966 Consumption	Annual Percent Change 1966-1980	Projected 1980 Demand	Annual Percent Change 1980-2000	Projected 2000 Demand	Average Annual Percent Change 1966-2000
Newsprint	(,000) tons	709	2.2	1,010	3.2	1,880	2.8
Printing & Fine Paper	(,000) tons	500	5.3	1,020	4.2	2,270	4.6
Tissue Paper	(,000) tons	200	7.7	530	5.2	1,300	5.6
Kraft & Other Paper	(,000) tons	484	2.7	690	2.4	1,090	2.5
Paperboard	(,000) tons	1,518	4.2	2,730	3.6	5,530	3.7
Building Boards	(,000) tons	268	3.8	450	1.9	660	2.6

SOURCE: Pulp and Paper Magazine of Canada, Vol. 72, No. 2 (February, 1971), p.22.

TABLE 4.7

CANADA'S EXPORTS OF PULP AND PAPER: 1980 & 2000

Product	Units	Actual 1966 Consumption	Annual Percent Change 1966-1980	Projected 1980 Demand	Annual Percent Change 1980-2000	Projected 2000 Demand	Average Annual Percent Change 1966-2000
Newsprint	(,000) tons	7,821	1.5	9,745	1.7	13,470	1.7
Printing & Fine Paper	(,000) tons	172	1.7	220	2.3	350	2.2
Tissue Paper	(,000) tons	14	2.6	20	2.1	30	2.2
Kraft & Other Paper	(,000) tons	69	3.8	115	2.2	160	2.4
Paperboard	(,000) tons	257	2.7	375	2.6	630	2.6
Building Boards	(,000) tons	40	3.4	65	1.9	95	2.6
Pulp	(,000) tons	4,085	3.7	6,890	2.7	11,640	3.1

SOURCE: Export Demand for Canada's Pulp and Paper 1980 & 2000, Pulp and Paper Magazine of Canada, Vol. 72, No. 2 (February, 1971), p. 25-29.

TABLE 4.8

COMPARING PROJECTIONS OF MANNING AND PULP AND PAPER MAGAZINE OF
CANADA FOR 1980 AND 2000 IN THOUSAND TONS

Year	Exported as Wood Pulp		Exported As Paper		Used in Canada's Consumption of Pulp & Paper		Total	
	Manning	P & P	Manning	P & P	Manning	P & P	Manning	P & P
1980	6,891	6,890	10,745	10,540	4,275	6,430	21,911	23,860
2000	11,639	11,640	14,988	14,735	8,565	12,730	35,192	39,105

According to Pulp and Paper Directory of Canada eight new pulp and paper mills were under construction in Canada in 1971.¹ Procter & Gamble Cellulose Ltd. is one of the mills. Appendix G contains a map showing the location of pulp and paper mills in Canada for 1971. These should all be in production by 1973. Six of the mills produce a bleached or semi-bleached kraft pulp, one produces a sulphite pulp, and one produces ground wood. The yearly production capacity for four of the mills is listed; the combined total is 990,250 tons. If the consumption is made that the other four mills are of like capacity, then combined output would be 1,980,500 tons. Assuming all other mills produce at the same rate as listed for 1969 in Table 4.4, then the 1973 production could be approximately 20,570,500 tons. If Manning's 3 percent per year growth rate assumption is correct, then, using 1969 as a base, the 1973 production should be 20,923,000 tons--which compares favorably with the figure presented above. Thus it appears that the industry is expanding approximately at the required rate and that Procter & Gamble Cellulose Ltd. plant is a vital part of that expansion.

¹"Pulp and Paper Mills in Canada," Pulp and Paper Directory of Canada, Pulp and Paper Magazine of Canada, 1972.

Procter & Gamble Cellulose Ltd. mill at Grande Prairie has a rated capacity of 250,000 tons per year.¹ This is 1.34 percent of the total 1969 production, 3.6 percent of the total 1969 sulphate pulp production, and 4.5 percent of the total bleached and semi-bleached sulphate pulp production.

Since 1947 the sulphate pulp production has grown at an average rate of 9.7 percent per year. If this rate continued to 1973, the output would be 10,058,000 tons. Of the eight new mills that will go into production by 1973, six will produce sulphate pulp. If the average output of each mill is 247,600 tons,² then 1,485,400 additional tons of sulphate pulp should be produced in 1973. Using 1969 figures from Table 4.4, this would bring the 1973 output to 8,430,400 tons, which is short of the projected level. Manning has estimated that production of papers and board other than newsprint will increase by 3.7 percent a year.³ If it is assumed that 3.7 percent is the correct rate, then the 1973 output should be 8,031,000 tons, which is somewhat less than the figure above. However, sulphate pulp is the fastest growing pulp; therefore, 3.7 percent probably understates the demand. Thus, it would appear that the industry is growing at approximately the correct rate and that the Procter & Gamble Cellulose Ltd. mill is a necessary part of that growth.

¹"News Round Up," Pulp & Paper Magazine of Canada, Vol. 46, No. 5 (May, 1972), p. 7.

²This figure was obtained by dividing the assumed 1,980,500 tons by 8.

³Manning and Grinnell, Forest Resources and Utilization in Canada to the Year 2000.

Estimation of Gross Payback

The second part of the analysis is to estimate the cash flow from operations and thus the utilization of property, plant, and equipment for Procter & Gamble Cellulose Ltd. The methodology was developed with the help of Mr. J. A. Peat,¹ Administrative Accountant, the University of Alberta, and is as follows: The cash flow² from operations were calculated for three selected companies. Next, the percentage of sales that cash flow represented was calculated. These percentages were averaged to obtain an average percentage figure to be used to calculate the cash flow for Procter & Gamble Cellulose Ltd. Then the percentage that cash flow was of property, plant, and equipment was calculated to obtain a gross payback³ or utilization percentage. Comparisons were then made between gross payback percentages of the selected companies and estimated Procter & Gamble Cellulose Ltd. figures (which were calculated from the estimated cash flow). Table 4.9 shows the results of the analysis for the three selected companies⁴ and Table 4.10 shows the results of the analysis for Procter & Gamble Cellulose Ltd.

The total estimated cost of the Procter & Gamble Cellulose Ltd. project is \$80,000,000. If the approximately \$12,000,000 incentive grant

¹ J. A. Peat, C. A., R.I.A., Administrative Accountant, Office of the Comptroller, University of Alberta, August 21, 1972.

² Cash flow is herein defined as the results of annual operations before provision for depreciation, depletion, and amortization, interest and debt charges, income taxes, and extra-ordinary charges or credits.

³ Gross payback on property, plant, and equipment was calculated prior to any recovery on original cost and prior to any return to the investors.

⁴ The location of the three selected companies are: Northwestern Pulp & Power Ltd., Alberta; Great Lakes Pulp & Paper Company Ltd., Ontario; and Bowaters Mersey Paper Company Ltd., Nova Scotia. A comparison of their gross payback percentages agrees with Manning's analysis that costs are greater in Eastern Canada than in Western Canada.

is deducted, the net cost becomes \$68,000,000. The Alberta Government will also be contributing approximately \$4,000,000 toward pollution control equipment.¹ Therefore, Procter & Gamble Cellulose Ltd. will have approximately \$64,000,000 invested in property, plant, and equipment.

In Table 4.10, four different cases using various assumptions have been worked out. The assumptions used in each case are listed below.

Case I assumptions:

(1) That the percent that cash flow is of sales for Procter & Gamble Cellulose Ltd. is equal to the last six-year average of Northwestern Pulp & Paper Ltd.

(2) That pulp sells for \$170 a ton.

(3) That Procter & Gamble Cellulose Ltd.'s output is equal to 250,000 tons per year, which is their rated capacity.

Case II assumptions:

(1) That the percent that cash flow is of sales is the same as in Case I.

(2) The Procter & Gamble Cellulose Ltd. plant's rated capacity is 28.2 percent larger than the rated capacity of Northwestern Pulp & Power Ltd. Therefore, the assumption is made that the sales for Procter & Gamble Cellulose Ltd. will be 28.2 percent larger than the last six-year average for Northwestern Pulp & Power Ltd.

¹ Alberta Department of Lands and Forests, The Forest Act, 1961, Forest Management Agreement with the Procter & Gamble Company of Canada, Ltd., 1969. The Company pays the first \$4,100,000 and the Government pays the next \$3,200,000, additional costs are split: 2/3 for the company and 1/3 for the Government. The pollution control equipment costs are expected to be in the neighborhood of \$8,000,000 (Jerrard, interview).

TABLE 4.9

ANALYSIS OF SELECTED PULP AND PAPER COMPANIES' CASH FLOW, AND UTILIZATION OF PROPERTY, PLANT, AND EQUIPMENT					
Company	Property, Plant & Equipment \$(,000)	Cash Flow from Operations \$(,000)	Gross Payback (Cash Flow As A % Of Property, Plant & Equipment)	Sales \$(,000)	Cash Flow As A % Of Sales
Northwestern Pulp & Power Ltd. ^a					
1971	64,502	7,632	11.8	31,573	24.2
1970	63,168	11,103	17.6	34,218	32.4
1969	63,082	8,946	14.2	31,910	28.0
1968	61,988	7,206	11.6	28,098	25.6
1967	61,435	6,898	11.2	27,557	25.0
1966	58,927	8,641	14.7	31,570	27.4
Average	62,184	8,404	13.5	30,821	27.1
Great Lakes Company Ltd. ^b					
1971	147,653	14,346	9.7	81,355	17.6
1970	136,570	18,812	13.7	79,667	23.6
1969	129,759	20,069	15.4	75,226	26.6
1968	127,446	14,905	11.6	66,086	22.5
1967	125,878	17,867	14.1	69,223	25.8
1966	122,380	18,194	14.8	63,857	28.4
Average	131,614	17,366	13.2	72,569	24.1
Bowaters Mersey Paper Company Ltd. ^c					
1971	57,566	5,803	10.1	28,162	20.6
1970	57,642	6,636	11.5	28,084	23.6
1969	57,629	6,881	11.9	29,084	23.6
1968	55,931	5,652	10.1 ^d	25,410	22.2
1967	55,163	7,288	N/A	N/A	N/A
1966	54,895	8,607	N/A	N/A	N/A
Average	56,471	6,811	10.9	N/A	22.5

^aNorthwestern Pulp & Power Ltd., Annual Reports, 1966-1971.

^bGreat Lakes Company Ltd., Annual Reports, 1966-1971.

^cBowaters Mersey Paper Company Limited, Annual Reports, 1966-1971.

^dN/A, Not Available.

TABLE 4.10

ESTIMATION OF GROSS PAYBACKS FOR PROCTER & GAMBLE CELLULOSE LTD.

Case			Gross Payback			
	Property, Plant, Equipment \$(,000)	Estimated Cash Flow From Operations \$(,000)	(Cash Flow As A % Of Property, Plant & Equipment)	Estimated Sales \$(,000)	Cash Flow As A % Of Sales From Table 4.14	
I	(i) 80,000	11,518	14.4	42,500	27.1	
	(ii) 68,000	11,518	16.9	42,500	27.1	
	(iii) 64,000	11,518	18.0	42,500	27.1	
II	(i) 80,000	10,705	13.4	39,503	27.1	
	(ii) 68,000	10,705	15.7	39,503	27.1	
	(iii) 64,000	10,705	16.7	39,503	27.1	
III	(i) 80,000	9,797	12.2	39,503	24.8	
	(ii) 68,000	9,797	14.4	39,503	24.8	
	(iii) 64,000	9,797	15.3	39,503	24.8	
IV	(i) 80,000	10,540	13.2	42,500	24.8	
	(ii) 68,000	10,540	15.5	42,500	24.8	
	(iii) 64,000	10,540	16.5	42,500	24.8	

Case III assumptions:

(1) That the percent that cash flow is of sales for Procter & Gamble Cellulose Ltd. is equal to the average obtained from the three selected companies.

(2) That the sales for Procter & Gamble Cellulose Ltd. are the same as listed in Case II (2).

Case IV assumptions:

(1) That the percent that cash flow is of sales for Procter & Gamble Cellulose Ltd. is the same as in Case III (1).

(2) That the sales for Procter & Gamble Cellulose Ltd. are the same as listed in Case I (2) and (3).

The new Procter & Gamble Cellulose Ltd. pulp mill is to be one of the most advanced and efficient mills in North America. Therefore, one can assume that their utilization or gross payback will be at least as good as those shown here. Even if the rates are calculated on the full \$80,000,000 they still compare favorably with those presented here. For this analysis the best comparison is with Northwestern Pulp & Power Ltd. as they are both in Alberta, they both have similar lease agreements, they both produce the same kind of pulp, and they both employ approximately 800 men.

Table 4.11 summarizes the gross payback or utilization rates calculated. One more important point must be considered here. According to Manning:

Total wood costs for newsprint are the lowest in western Canada, which is followed by the southern United States, eastern Canada, Finland, and Sweden. Manufacturing costs were lowest in Finland in 1968, followed by those of western Canada, the southern United States, eastern Canada, and Sweden. In Kraft pulp, western Canada has the lowest manufacturing costs.¹

¹ Manning, Forest Resources and Utilization in Canada to the Year 2000.

TABLE 4.11

COMPARING GROSS PAYBACK RATES FOR THE THREE SELECTED COMPANIES
AND PROCTER AND GAMBLE CELLULOSE LTD.

Company	1971	1970	1969	1968	1967	1966	Average of Estimates	Average of Averages or Estimates
Northwestern Pulp & Power Ltd.	11.8	17.6	14.2	11.6	11.2	14.7	13.5	12.8
Great Lakes Company Ltd.	9.7	13.7	15.4	11.6	14.1	14.8	13.2	
Bowater Mersey Paper Company Ltd.	10.1	11.5	11.9	10.1	N/A	N/A	10.9	
Procter & Gamble Cellulose Ltd.								
\$80,000,000								
Case I							14.4	13.3
II							13.4	
III							12.2	
IV							13.2	
\$68,000,000								
Case I							16.9	15.6
II							15.7	
III							14.4	
IV							15.5	
\$64,000,000								
Case I							18.0	16.6
II							16.7	
III							15.3	
IV							16.5	

Therefore, assuming Manning's analysis is correct, Western Canadian Producers of kraft pulp--of which Procter & Gamble Cellulose Ltd. will be one--have the lowest total wood costs and the lowest manufacturing costs in the world.

Opinions of Selected Sources

The third and final part of the analysis is to present the opinions of a number of sources who were or are involved in various aspects related to the topic.

Mr. Ray Speaker felt that Procter & Gamble Cellulose Ltd. would not have located their mill in the Grande Prairie area without the incentive grant.¹ The main reason cited was that several other operations in Canada similar to theirs were already being subsidized in some form or other and, therefore, they did not feel they could compete without the grant.²

An interview with Mr. Jerry Bigam offered the same conclusions. He also cited that, at that point in time, the world demand for pulp was lagging and the Canadian dollar was increasing in value relative to the U.S. dollar thereby putting some uncertainty into the picture for Procter & Gamble Cellulose Ltd. Both Mr. Bigam and local Department of Regional

¹Speaker, Interview.

²A number of references can be given here. One is: "Unique Partnership of Government and Industry Makes Pulp in Saskatchewan," Pulp & Paper Magazine of Canada, (October 4, 1968). This article points out how Parsons & Whittemore, a U.S. firm, is in a partnership arrangement with the Saskatchewan Government. Parsons & Whittemore hold 70 percent of the equity in the \$65,000,000 mill for a cash payment of \$7,000,000. The province has the remaining 30 percent of the equity. Parsons & Whittemore also received a \$5,000,000 Department of Regional Economic Expansion incentive grant. The province, for their 30 percent equity, guarantee a \$46,000,000 U.S. loan, as well as building of extensive, all-weather, multi-purpose forestry trunk roads; establishment of Saskatchewan Pulpwood Ltd. to supply timber to the pulp company for the first four years at a base price of \$18.50 a cord f.o.b.

Economic Expansion officials mentioned that the Department does a complete analysis of all projects before giving grants which would also indicate that the incentive was a necessary inducement. The results of the analysis are considered confidential.¹

There are also some points to be considered on the opposing side. In an interview with Mr. Dennis Cauvin, the same question was asked. Mr. Cauvin could not comment definitely without first seeing a complete benefit-cost study, but he did indicate that many of the mills in Eastern Canada are old and inefficient compared to the new Procter & Gamble mill. Therefore, if these are also included in an analysis of the rates of return to pulp mills, the results will be biased downward giving an inaccurate picture.²

Mr. Eric Jerrard, public relations officer for Procter & Gamble in Grande Prairie, felt that if the grant system has not existed they may have gone into the area anyway. The main reasons were the excellent quality of the timber which produces a very high grade of pulp and the captive market for the products.³

the mill; concessions in stumpage rates; a commitment to provide nursery stock at no cost to the company; and installation of a natural gas line to serve the mill. The reader is referred to the above mentioned article for a more complete picture. Another reference: "News," Pulp & Paper Magazine of Canada, (April 17, 1970), describes some of the involvements in Manitoba. It shows how the government's liability in a \$135,000,000 project could reach as high as \$90,000,000. A final reference is that of: Philip Mathias, "Forced Growth," Five Studies of Government Involvement in the Development of Canada (Toronto: James Lewis & Samuel Publishers, 1971).

¹Bigam, Interview.

²Personal Interview with Mr. Dennis Cauvin, Forestry Economist, Department of Lands and Forests, Alberta, June 21, 1972.

³Jerrard, Interview.

An article in the March, 1971 issue of the Pulp & Paper Magazine of Canada also makes some comments that are relevant to the situation. The essence of the article is that the demand is down for pulp and paper, thus prices for Canadian producers are declining (U.S. \$172 a ton to \$135 a ton). Two of the reasons are the increase in capacity due to new mills and the floating of the Canadian dollar. However, the article also points out that by 1973, when the new Procter & Gamble Cellulose Ltd. mill is scheduled to go into production, there will probably be a global shortage of Kraft pulp, or at least supply and demand will balance out. Therefore, prices could reach as high as \$200 (U.S.) a ton. It also points out that there will be a shortage if no new mills are built. And very few new mills are being built. The article also mentions that the greatest benefits will come to Western producers because of increased margins and a larger pulp leverage share.¹

An additional article from the Bank of Montreal Business Review also lends support to the above. It indicates that the future prospects for Kraft pulp are better than in the past.²

The purpose of the analysis of Criteria Variable II was to assess the effect public funds had on the decision made by Procter & Gamble Cellulose Ltd. to locate their mill in the Grande Prairie area. The conclusion which can be drawn from the evidence supplied is that public funds had no effect on their decision. In other words, Procter

¹Ron Grant, "Pulp Grades Are The Only Break in the Gloomy Prospect for the Pulp & Paper Industry's Products," Pulp & Paper Magazine of Canada, March, 1971, pp. 37.

²Bank of Montreal, "The Resurgence of Pulp & Paper," Business Review, November 26, 1969, pp. 2.

& Gamble probably would have carried through with the project in the absence of the grant. The reasons are as follows: Part one of the analysis showed that the mill was a necessary part of the overall expansion of the industry. Part two indicates that Western Canada has the lowest wood and manufacturing costs and that Procter & Gamble can expect, by interindustry comparisons, a reasonable gross payback. The third part of the analysis suggests that a brisk demand is expected by 1973 and therefore their plant will be needed to help meet this demand. In addition, the quality of the timber in the area is excellent for their purposes.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study attempted to do three things:

(1) To calculate the amount of underemployment existing in each census division in Alberta with primary reference to Census Division Fifteen.

(2) To evaluate the effect of public funds on the decision by Procter & Gamble Cellulose Ltd. to locate in the Grande Prairie area.

(3) To test an evaluation system for regional development.

Conclusions

The results of the study show that a substantial amount of underemployment exists in Alberta's farm sector. The majority of it appears to exist in Census Divisions One, Nine, Ten, Eleven, Twelve, Thirteen, Fourteen, and Fifteen. This conclusion is based on a production function for Alberta's agriculture showing diminishing returns with respect to labor and capital, with the elasticity of capital being 0.66 and that of labor being 0.42 for 1966. If these coefficients are summed, they come very close to one, indicating almost constant returns to scale.

The study also shows that Public funds probably had no effect on the decision of Procter & Gamble Cellulose Ltd. to locate their mill in the Grande Prairie area. The study indicates that the mill is an integral part of the industry's expansion process. As a result of the grants, Procter & Gamble Cellulose Ltd. will also have one of the highest gross payback percentages (using an inter-industry comparison). The cost of production in Western Canada is the lowest in the world, so Procter & Gamble Cellulose Ltd. will probably be earning one of the highest gross payback percentages of any mill in Canada.

The fact remains, however, that the incentive grant system is a reality, the area is designated, and the grant was previously promised to MacMillan Bloedel. Thus, under the present structure, Procter & Gamble Cellulose Ltd. is legally entitled to it.

Also, from a comparative advantage point of view, the region has large good quality timber resources and thus the mill is well located. A major industry, like a pulp mill, will have other linkages such as machine shops and construction companies, which, through the multiplier effect, will help the region grow.¹

¹Jerrard, Interview. Thirty new businesses are expected to come into Grande Prairie as a result of the establishment of the mill. Some of these have already arrived and are directly attributed to the mill (for example, road construction companies).

This thesis also attempted to test an evaluation system for regional development. Some of the initial problems encountered were mentioned in Chapter III. The present purpose is to offer some constructive criticism to help operationalize it.

One point of concern relates to the literary depth and complexity of the system. It is felt that an evaluation team would encounter difficulties in understanding and interpreting the system. Therefore, some simplification is needed to aid understanding. This may be accomplished with the use of examples to aid explanation and by suggesting guidelines for some of the statistical recommendations.

The system certainly makes a positive contribution with its inclusion of economic, sociological, and psychological criteria variables, as well as suggesting an analysis of the relationship between the variables in both time and space dimension. Factors that are endogenous and exogenous to the variables are to be considered as well.¹ However, if a number of criteria variables were used, the complexity of it could require a programming model similar to input-output to analyze and explain all the relationships. If the sociological and psychological criteria variables could be case in a programming framework, new doors in evaluating programs could be opened.

The system also suggests that a "final index would compile all criteria variables into one score of economic and social change."² This could be an interesting and revealing aspect of evaluation. However,

¹Apedaile, et al., Evaluation System.

²Ibid.

no guidelines were given on how to construct it or what to include in it. This aspect should be elaborated. If these indices could be estimated for several regions, then helpful comparisons could be made.

The evaluation system also says that:

...at least two independent measures must be made, one in the time and space dimension relevant to the intervention program, the other in an independent time and space dimension to provide a basis for comparison.¹

Krutilla, in "Criteria for Evaluating Regional Development Programs," disagrees with this view point. He uses income as an example to illustrate his point. He says:

...if relative changes in total income are used to measure regional development, the influence of other governmental programs which affect regional income, regardless of the administrative device employed, must be eliminated from both regions to provide the *ceteris paribus* conditions essential for a valid comparison.²

Another point is that these development activities often have effects that flow over into other regions as well. The question then arises: Can two regions really be compared? In other words, to make the comparison accurate they should have uniform development potential.

Pre-evaluation of a region, when necessary, is a built-in component of the evaluation system. On occasion it may be valuable to carry this a little further. For example, if a program is underway and it is felt that another project would be helpful, then perhaps something along the lines of benefit-cost could be used to ascertain whether or not the project should be launched. This could enable evaluators to

¹Ibid.

²John V. Krutilla, "Criteria for Evaluating Regional Development Programs," American Economic Review, Vol. 45, No. 2 (May, 1955) pp. 120-132.

keep a check on the administrators decisions. It would also act as a deterrent on administrators, who would then feel greater pressure to make wise decisions.

Recommendations

(1) Several studies, this one included, have documented the fact that a large portion of Alberta and Canadian agriculture is in a depressed state. Various attempts have been made, with little success, to overcome this situation. The magnitude of the problem, as documented by this study, is extensive and involves approximately 40 percent of Alberta's farm labor force (using 1966 figures). The large number of people involved, approximately 38,000 workers, and the huge sum of money which would be needed to adjust Alberta agriculture to their absence shows the difficulty of attempting to solve low farm income problems solely through expanded industrial or urban employment. However, this is not to say that off-farm employment is unnecessary, only that it is not enough. The magnitude of the problem also shows that the solution will necessarily have to be a long run goal.

(2) Another recommendation is that future regional development programs endorse, wherever feasible, labor intensive industries instead of capital intensive industries. A region's resources should be inventoried and industries selected according to which will make the most efficient use of those resources. Top priority should be given to industries that will produce extensive linkages within the region.

(3) Not much is known about the factors affecting labor productivities in Alberta agriculture. Therefore, it is recommended that further research be initiated in this area. Such things as the role of

education, managerial ability, customs, age of worker, as well as capital features, should be considered. The results of this research should be used to increase the effectiveness of any new programs aimed at aiding farmers.

(4) The basis for many governmental decisions is often confidential instead of being released to the public for debate and evaluation. Therefore, an important recommendation is that any studies or material which have been used to make public policy decisions, especially decisions involving large expenditures of public funds, be open for public inspection along with the stated reasons for the decision. It is also recommended that a careful pre-evaluation be made to ascertain the best use for public funds in trying to solve the problems of regional imbalance.

SELECTED REFERENCES

BOOKS

- CAVES, R. E. Trade and Economic Structure. Cambridge: Harvard University Press, 1960.
- DILLION, John L. The Analysis of Response in Crop and Livestock Production. Toronto: Pergamon Press, 1966.
- FRIEDMANN, John, and Alonso, William, ed. Regional Development and Planning: A Reader. Massachusetts: M.I.T. Press, 1964.
- HAYAMI, Yujiro, and Ruttan, Vernon W. Agricultural Development: An International Perspective. Baltimore: The Johns Hopkins Press, 1971.
- HEADY, Earl O., and Dillion, John L. Agricultural Production Functions. Ames, Iowa: Iowa State University Press, 1961.
- HIRSCHMAN, A. O. The Strategy of Economic Development. New Haven: Yale University Press, 1958.
- LAMPARD, Eric E. "The History of Cities in Economically Advanced Areas." Regional Development and Planning: A Reader. Edited by J. Friedmann and William Alonso. Massachusetts: M.I.T. Press, 1964.
- LEIBENSTEIN, Harvey. Economic Backwardness and Economic Growth. New York: John Wiley & Sons, Inc., 1957.
- MATHIAS, Philip. Forced Growth: Five Studies of Government Involvement in the Development of Canada. Toronto: James Lewis and Samuel Publishers, 1971.
- NAVARRETO, Alfredo, Jr., and Navarreto, Ifigenia M. "Underemployment in Underdeveloped Economies." The Economies of Underdevelopment. Edited by A. N. Agarwala and S. P. Singh. New York: Oxford University Press, 1968.
- PERLOFF, Harvey, and Wingo, Lowdon, Jr. "Natural Resource Endowment and Regional Economic Growth." Regional Development and Planning: A Reader. Edited by J. Friedmann and William Alonso. Massachusetts: M.I.T. Press, 1964.
- ROBINSON, Joan. Essays in the Theory of Employment. Oxford: Basil Blackwell, 1953.

RODWIN, Lloyd. "Choosing Regions for Development." Regional Development and Planning: A Reader. Edited by J. Friedmann and William Alonso. Massachusetts: M.I.T. Press, 1964.

ROSTOW, W. W. The Stages of Economic Growth. Cambridge: Cambridge University Press, 1960.

SCHULTZ, Theodore W. Transforming Traditional Agriculture. New Haven: Yale University Press, 1964.

_____. Agriculture in an Unstable Economy. London: McGraw-Hill Book Company Inc., 1945.

GOVERNMENT AND AFFILIATED ORGANIZATIONS

ALBERTA. Department of Lands and Forests. Public Hearing on Proposed Pulp Mill Development in the Grande Prairie Area. Edmonton, Alberta: 1967.

_____. The Forest Act 1961, Forest Management Agreement with the Procter & Gamble Company of Canada Limited. Edmonton, Alberta: 1969.

BIGAM, Jerry F. Industry and Resources Alberta's Census Division 15. Edmonton: Alberta Department of Agriculture, 1968.

CANADA. Department of Regional Economic Expansion. D.R.E.E. Ottawa: Information Canada, 1971.

_____. News Release. Ottawa: Thursday, December 10, 11:30 A.M. E.S.T.

_____. Office Consolidation of the Regional Development Incentives Act, 1968-69, C. 56, amended by 1970-71, C. 10. Ottawa.

_____. Regional Development Incentives Regulations, P.C. 1969-1571, as amended by P.C. 1971-145. Ottawa.

_____. Regional Economic Expansion. Canada/Alberta Second Special Area Agreement. Ottawa: September 1, 1971.

CANADIAN Council on Rural Development. Rural Canada 1970: Prospects and Problems. Third Report and Review. Ottawa: Canadian Council on Rural Development, 1969. Staff Study No. 14.

CHERNICK, S. E. Interregional Disparities in Income. Ottawa: Economic Council of Canada, 1966.

DOMINION Bureau of Statistics. Agriculture, Alberta 1961. Catalogue No. 96-539, Vol. V, Part 3. Ottawa: D.B.S., 1961.

- _____. Agriculture, Alberta 1966. Catalogue No. 96-610, Vol. V. (5-3). Ottawa: D.B.S., 1968.
- _____. Canadian Forestry Statistics. Catalogue No. 25-502. Ottawa: D.B.S., 1959.
- _____. Canadian Forestry Statistics. Catalogue No. 25-503. Ottawa: D.B.S., 1964.
- _____. Canadian Forestry Statistics. Catalogue No. 25-202. Ottawa: D.B.S., 1960-1969.
- _____. Imports by Commodities. Catalogue No. 65-007. Ottawa: D.B.S.
- _____. Population, Rural and Urban Distribution 1966. Catalogue No. 92-608, Vol. 1 (1-8). Ottawa: D.B.S., 1968.
- ECONOMIC Council of Canada. The Canadian Economy From the 1960's to the 1970's: Fourth Annual Review. Ottawa: E.C.C., September, 1967.
- _____. The Challenge of Growth and Change: Fifth Annual Review. Ottawa: E.C.C., September, 1968.
- _____. Perspectives 1975: Sixth Annual Review. Ottawa: E.C.C., September, 1969.
- _____. Toward Sustained and Balanced Economic Growth: Second Annual Review. Ottawa: ECC., December, 1965.
- FITZPATRICK, J. M. A Profile of Regional Export Trade in Forest Products, Canada, 1969. No. 1308. Ottawa: Department of the Environment, Canadian Forestry Service, 1972.
- HARVEY, L. N. Land, Industries and Related Factors in the Peace River District. Edmonton, Alberta: Northern Alberta Development Council, 1968.
- HUMAN Resources Development Authority. B-15 Plan: An Outline for Rural Development in Census Division 15. Edmonton: Human Resources Development Authority, May, 1969.
- MANNING, Glenn H., and Grinell, H. Rae. Forest Resources and Utilization in Canada to the Year 2000. No. 1304. Ottawa: Department of the Environment, Canadian Forestry Service, 1971.
- A REPORT by the President's National Advisory Commission on Rural Poverty. The People Left Behind. Washington: Government Printing Office, 1967.
- REPORT of the Federal Task Force on Agriculture. Canadian Agriculture in the Seventies. Ottawa: Queen's Printer, December, 1969.

STATISTICS Canada. Requested Data on Labor, Value of Products Sold, and Capital. Ottawa: Statistics Canada.

WEBSTER, D. R. Central Places in the Peace River Region of Alberta. Grande Prairie: Peace River Regional Planning Commission, 1971.

INTERVIEWS

BIGAM, J. Economist, Interview. Edmonton, Alberta, June, 1972.

CAUVIN, D. Economist, Interview. Edmonton, Alberta, June 21, 1972.

DEAN, J. Assistant Director of Canada Manpower Center, Interview. Grande Prairie, Alberta, August 9, 1972.

JERRARD, E. Public Relations Officer, Interview. Grande Prairie, Alberta, June 26, 1972.

PEAT, J. A. Administrative Accountant, Interview. Edmonton, Alberta, August 17, 1972.

SPEAKER, Ray. Former Chairman of Human Resources Development Authority, Interview. Edmonton, Alberta, July 10, 1972.

JOURNALS

ARROW, K. J.; Chenery, H. B.; Mirkos, B. S.; and Solow, R. M. "Capital-Labor Substitution and Economic Efficiency." Review of Economics & Statistics, Vol. 43 (August, 1961), 225-250.

BHATTACHORJEE, Jyoti P. "Resource Use and Productivity in World Agriculture." Journal of Farm Economics, Vol. 37 (February, 1955), 57-71.

BISHOP, C. E. "Problems of Raising Incomes of Low Production Areas of Agriculture." Journal of Farm Economics, Vol. 42, Part 2 (1960), 1196-1206.

_____. "Underemployment of Labor in Agriculture." Journal of Farm Economics, Vol. 36 (1954), 258-272.

CAMBRIDGE Publishers (Canada). Alberta Business Journal, Vol. 6 (March, 1972), 9-13.

CHENERY, Hollis B. "Comparative Advantage and Development Policy." American Economic Review, Vol. 51 (March, 1961), 20.

CORREA, Hector. "A Method for Evaluating Underemployment (The Case for Brazil)." The Indian Economic Journal, Vol. XII, No. 1 (July-September, 1964), 82-86.

- GOLD, Ronald, B. "Subsidies to Industry in Pennsylvania." National Tax Journal, Vol. XIX, No. 3 (September, 1966), 286-297.
- GRILICHES, Zvi. "Research Expenditure, Education, and the Aggregate Agriculture Production Function." American Economic Review, Vol. 54 (December, 1964), 961-974.
- KRUEGER, Arne D. "Factor Endowments and Per Capita Income Differences Among Countries." Economic Journal, Vol. 78 (September, 1968), 641-659.
- KRUTILLA, John V. "Criteria for Evaluating Regional Development Programs." American Economic Review, Vol. 45, No. 2 (May, 1955), 120-132.
- POETSCHKE, L. E. "Regional Planning for Depressed Rural Areas - The Canadian Experience." Canadian Journal of Agricultural Economics, Vol. XVI, No. 1 (1968), 8-20.
- RANIS, Gustov, and Fei, John C. H. "A Theory of Economic Development." American Economic Review, Vol. 51 (September, 1961), 533-558.

MISCELLANEOUS

- APEDAILE, L. P.; Matthews, V.; and Stewin, L. An Evaluation System for Regional Development. Edmonton: University of Alberta, 1971.
- BANK of Montreal. "The Resurgence of Pulp and Paper." Business Review, November 26, 1969, 1-4.
- BANK of Nova Scotia. "Changing Times for Pulp and Paper." Monthly Review, March, 1969, 1-4.
- BOWATERS Mersey Paper Company Limited. Annual Report and Account, 1966-1971.
- GLOBE AND MAIL. Editorial, August 29, 1972, B2.
- FINANCIAL POST. Survey of Markets and Business Year Book. 39th-47th Editions. Toronto: Mclean-Hunter Ltd., 1963-1971.
- GREAT Lakes Paper Company Ltd. Annual Report, 1966-1971.
- NORTHWESTERN Pulp & Paper Ltd. Annual Report, 1966-1971.
- PROCTER & GAMBLE Cellulose Ltd. "Estimated Organization Summary," Grande Prairie, 1970. (Mimeographed).
- _____. Fact Sheet. Grande Prairie, Alberta.
- PULP & PAPER Magazine of Canada. "Procter & Gamble Alberta Mill Underway." Pulp & Paper, May, 1972.

- _____. "News." Pulp & Paper, April 17, 1970, p. 7.
- PULP & PAPER Mills in Canada. Pulp & Paper Directory of Canada.
Pulp & Paper Magazine of Canada, 1972.
- _____. "Unique Partnership of Government and Industry Makes Pulp
in Saskatchewan." Pulp & Paper, October 4, 1968, 60-62.
- _____. "Canada's Domestic Demand for Forest Products." Vol. 72,
No. 2 (February, 1971).

APPENDIX A

DEPARTMENT OF REGIONAL ECONOMIC EXPANSION

The Department of Regional Economic Expansion was created on April 1, 1969, as a result of the passage by Parliament of the Government Organization Act, 1969 [Information Canada, 1971].

It was designed as the federal instrument to reduce economic and social disparities between various regions of Canada. The creation of this Department terminated a number of existing agencies and programs - Atlantic Development Board (A.D.B.), Area Development Agency (A.D.A.), and the Fund for Rural Economic Development (F.R.E.D.).¹

The work of the Department can be classified under four main headings.

(1) Planning and Programming: This involves assessing problems and identifying possibilities of change and development. For each region or area it must be done jointly with the province concerned and in co-operation with local organizations, as well as with other federal agencies.

(2) Industrial Incentives: Industrial incentives make investment in viable industries more attractive in the slow-growing regions and thus improve employment opportunities. This involves identifying economic activities that have potential for establishment or expansion in the region and developing means of encouraging these activities, including the provision of incentives to reduce their capital costs.

(3) Infrastructure Assistance: To provide the incremental social capital that is necessary to better opportunities such as improved

¹The references used in this short summary are: Office Consolidation of the Regional Development Incentives Act 1968-69, C. 56, amended by 1970-71, C. 10; the Regional Development Incentives Regulations P.C. 1969 - 1571 as amended by P.C. 1971 - 145; and D.R.E.E. (Ottawa: Information Canada, 1971).

community services (schools, water supply and sewage systems, roads, residential sub-divisions, industrial parks, etc.), particularly at growth points. Such services are normally financed locally and provincially, but in slow-growth regions special federal assistance is essential to the financing of a major development effort. This involves detailed co-operation with provinces and municipalities in the identification, planning, and implementation of priority projects.

(4) Social Adjustment and Rural Development: To assist people in taking advantage of new opportunities and in increasing their incomes from the more effective utilization of rural resources. This involves a variety of programs of counselling, training, assistance to mobility, conservation, recreational development, consolidation of holdings, land improvement, etcetera. While a few of these are carried out directly, most involve cost-sharing programs with the provinces.

The organization of the Department reflects the three essential phases in its operations. These phases are: a) the setting of goals and formulation of plans; b) the implementation of projects; c) the evaluation and control of operations. These tasks are the responsibility of the Planning Division, Regional Operations Division, and Evaluation and Administration Division, in that order, and are assisted by the Implementation Services Division, the Public Information Division, and the Personnel Division.

One of the main programs of the Department provides development incentives to encourage new productive employment in designated or special areas. These incentives are not continuing subsidies but are

designed to offset the initial disadvantage of an industrial investment in the areas where additional employment is most needed.

The grant incentives can be substantial; as much as half the capital to be employed in an operation of up to \$40,000 per job created. The Department can also assist in financing new operations and certain expansions and modernizations by guaranteeing part of a company's borrowing.

Most manufacturing and processing industries are eligible for both incentive grants and loan guarantees. Loan guarantees, but not incentive grants, can be provided for hotels, convention centers, and recreational facilities. Also, in large centers of population, warehousing and freight handling facilities are not eligible for expansion and modernization grants.

In Alberta, the maximum incentive grant could be up to 20 percent of capital costs for expansions or modernizations and up to 25 percent of capital costs, plus up to \$5,000 per job created, for new plants or new plant expansions.

The Department also has a special areas program. Here its activities are mainly infrastructure assistance, incentives for manufacturing or commercial projects, and social adjustment measures.

APPENDIX B
1961 AND 1966 CENSUS DATA

TABLE B.1

1966 CENSUS DATA

Size in Acres	Number of Farms	Hired Workers	Other Workers	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 1						
Under 3	15	8	9	32	4,282	17,499
3 - 9	16	5	25	46	4,100	6,997
10 - 69	34	88	110	232	17,703	109,356
70 - 239	166	10	45	171	38,588	94,925
240 - 399	217	10	41	268	77,472	145,701
400 - 559	177	8	22	207	70,249	148,324
560 - 759	265	9	100	374	135,369	241,293
760 - 1119	322	15	41	378	209,821	309,228
1120 - 1599	348	11	63	422	280,948	412,661
1600 - 2239	225	21	102	348	242,405	340,298
2240 - 2879	103	16	42	161	127,584	170,795
2880 +	244	166	269	679	535,031	636,127
Census Division 2						
Under 3	51	3	10	64	5,485	22,164
3 - 9	94	30	36	160	14,655	51,346
10 - 69	283	13	49	345	49,613	135,852
70 - 239	1,077	58	453	1,588	406,892	983,442
240 - 399	874	84	526	1,485	530,575	1,605,651
400 - 559	439	46	348	833	313,668	591,403
560 - 759	400	86	385	871	358,491	704,485
760 - 1119	427	77	257	761	451,595	747,964
1120 - 1599	344	87	272	653	476,813	755,045
1600 - 2239	197	77	248	522	339,757	524,202
2240 - 2879	100	67	157	324	222,996	285,130
2880 +	195	595	765	1,555	900,221	1,251,486
Census Division 3						
Under 3	46			46	3,142	5,781
3 - 9	41			41	4,153	4,718
10 - 69	100	6	7	113	17,632	36,261
70 - 239	298	17	45	360	69,874	107,342
240 - 399	350	9	63	422	141,276	202,565
400 - 559	278	10	58	346	150,943	187,016
560 - 759	339	9	78	426	242,596	336,054
760 - 1119	421	31	163	615	418,779	554,040
1120 - 1599	291	46	136	473	383,875	596,717
1600 - 2239	147	43	117	307	262,768	391,461
2240 - 2879	63	28	68	159	127,717	162,017
2880 +	122	614	711	1,447	606,909	880,238

1966 CENSUS (Continued)

Size in Acres	Number of Farms	Hired Workers	Other Workers	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 4						
Under 3	1			1	122	346
3 - 9	4			4	374	529
10 - 69	4			4	308	133
70 - 239	45	2	3	50	4,818	17,036
240 - 399	111	1	1	113	19,006	30,357
400 - 559	108	1	2	111	30,198	52,583
560 - 759	119	2	12	133	41,861	72,270
760 - 1119	257	3	31	291	116,367	188,402
1120 - 1599	322	9	58	389	181,587	304,336
1600 - 2239	284	23	77	384	210,999	317,263
2240 - 2879	164	15	46	225	137,049	197,785
2880 +	508	282	425	1,215	746,212	1,042,374
Census Division 5						
Under 3	10			10	1,052	1,990
3 - 9	22			22	2,595	10,007
10 - 69	74	2	8	84	44,084	47,235
70 - 239	250	6	18	274	62,620	114,562
240 - 399	451	6	27	484	181,064	271,748
400 - 559	475	25	84	584	294,587	445,704
560 - 759	597	32	119	748	482,283	770,374
760 - 1119	854	69	147	1,070	900,765	1,340,509
1120 - 1599	622	93	331	1,046	858,085	1,305,357
1600 - 2239	269	78	215	562	503,581	810,843
2240 - 2879	105	49	107	261	252,180	403,175
2880 +	131	309	433	873	486,879	827,389
Census Division 6						
Under 3	23	5	10	38	3,869	52,449
3 - 9	77	13	77	167	20,596	114,707
10 - 69	345	40	88	473	107,123	394,193
70 - 239	778	48	80	906	257,820	444,572
240 - 399	909	53	140	1,102	490,637	669,017
400 - 559	663	49	146	858	517,759	704,500
560 - 759	666	90	232	988	675,726	972,457
760 - 1119	556	127	273	956	744,019	1,149,035
1120 - 1599	295	120	217	632	526,885	1,011,138
1600 - 2239	117	79	133	329	278,049	409,579
2240 - 2879	71	58	114	243	215,385	324,159
2880 +	81	306	378	765	432,960	747,971

1966 Census (Continued)

Size In Acres	Number of Farms	Hired Workers	Other Workers	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 7						
Under 3	15			15	1,113	1,942
3 - 9	26	1	1	28	2,053	3,093
10 - 69	70		12	82	10,614	25,000
70 - 239	335	2	24	363	59,769	125,756
240 - 399	623	8	27	658	192,288	274,033
400 - 559	668	15	63	746	304,052	439,454
560 - 759	693	22	84	799	402,088	587,728
760 - 1119	1,063	63	236	1,362	816,504	1,240,334
1120 - 1599	674	69	194	937	671,061	1,018,051
1600 - 2239	371	72	220	663	472,780	738,435
2240 - 2879	124	44	102	270	200,511	336,342
2880 +	137	204	258	599	315,811	506,098
Census Division 8						
Under 3	26		1	27	2,745	4,973
3 - 9	91	5	6	102	12,316	25,257
10 - 69	334	8	21	363	61,664	189,129
70 - 239	1,409	43	167	1,619	351,407	549,404
240 - 399	1,698	40	187	1,925	757,173	1,059,502
400 - 559	1,148	58	215	1,421	757,588	1,157,705
560 - 759	713	81	242	1,035	611,238	1,015,396
760 - 1119	560	105	275	940	626,435	997,029
1120 - 1599	205	74	160	439	319,546	567,251
1600 - 2239	60	126	174	360	147,869	314,497
2240 - 2879	17	11	16	44	40,793	80,784
2880 +	12	57	68	137	53,741	94,835
Census Division 9						
Under 3						
3 - 9	3		3	6	906	85
10 - 69	8	3	3	14	1,573	2,800
70 - 239	35		1	36	5,732	5,772
240 - 399	29			29	8,836	8,531
400 - 559	22		1	23	11,793	10,041
560 - 759	20	1	2	23	10,544	6,153
760 - 1119	18		3	21	12,998	10,251
1120 - 1599	10	2	3	15	6,538	3,438
1600 - 2239	8	3	9	20	9,609	6,186
2240 - 2879	6	1	3	10	6,647	5,582
2880 +	18	16	29	63	43,764	51,854

1966 CENSUS (Continued)

Size In Acres	Number of Farms	Hired Workers	Other Workers	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 10						
Under 3	18	2	9	29	1,683	6,769
3 - 9	68	1	2	71	6,868	14,801
10 - 69	204	6	13	223	26,845	72,941
70 - 239	1,660	14	115	1,789	309,660	432,482
240 - 399	2,619	22	337	2,978	892,423	1,186,359
400 - 559	1,831	42	337	2,170	914,822	1,244,734
560 - 759	1,272	43	310	1,625	836,664	1,134,908
760 - 1119	1,095	87	408	1,590	953,572	1,416,152
1120 - 1599	425	91	271	787	502,998	792,208
1600 - 2239	157	44	149	350	252,777	372,423
2240 - 2879	52	27	62	141	101,036	131,753
2880 +	39	103	130	272	109,068	148,691
Census Division 11						
Under 3	54	8	9	71	8,849	32,601
3 - 9	207	22	46	275	38,410	73,282
10 - 69	551	58	134	743	152,331	337,785
70 - 239	2,746	84	280	3,110	785,795	1,072,314
240 - 399	2,481	117	461	3,059	1,151,688	1,496,664
400 - 559	1,175	114	328	1,617	766,681	1,061,951
560 - 759	666	88	244	998	576,137	825,852
760 - 1119	362	93	191	646	407,484	592,090
1120 - 1599	110	57	162	329	184,251	283,486
1600 - 2239	23	36	72	131	92,806	113,468
2240 - 2879	6	4	7	17	14,139	13,777
2880 +	14	119	147	280	87,040	83,075
Census Division 12						
Under 3	17		1	18	1,280	11,930
3 - 9	40	6	14	60	4,196	26,644
10 - 69	66	1	5	72	6,197	6,840
70 - 239	805	2	87	894	100,093	122,374
240 - 399	1,155	5	185	1,345	264,700	344,982
400 - 559	805	7	196	1,008	252,599	350,222
560 - 759	565	11	172	748	228,341	293,010
760 - 1119	435	18	195	648	206,516	262,871
1120 - 1599	152	12	75	239	85,993	103,390
1600 - 2239	64	7	53	124	41,269	59,142
2240 - 2879	11	3	9	23	8,152	9,394
2880 +	19	9	12	40	15,819	10,067

1966 CENSUS (Continued)

Size In Acres	Number of Farms	Hired Workers	Other	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 13						
Under 3	20	1	2	23	1,291	5,413
3 - 9	45		2	47	4,197	18,306
10 - 69	108	1	10	119	14,564	34,533
70 - 239	1,617	8	99	1,714	252,161	310,565
240 - 399	2,177	16	201	2,394	656,888	852,455
400 - 559	1,336	13	214	1,563	581,630	844,856
560 - 759	776	27	190	893	428,837	567,373
760 - 1119	557	38	217	812	404,048	549,308
1120 - 1599	138	28	88	254	137,161	186,948
1600 - 2239	35	9	22	66	47,390	62,934
2240 - 2879	11	1	19	31	19,126	31,419
2880 +	7	37	51	95	20,197	32,719
Census Division 14						
Under 3				1	52	21
3 - 9				13	1,770	1,721
10 - 69	13					
70 - 239	265		6	271	35,969	28,384
240 - 399	305	3	29	337	69,846	62,012
400 - 559	214	4	25	243	71,189	65,934
560 - 759	117	2	15	134	52,641	57,254
760 - 1119	69	2	25	96	40,446	38,136
1120 - 1599	25	4	12	41	18,554	16,650
1600 - 2239	6	1	5	12	8,055	9,083
2240 - 2879	3		3	6	2,857	2,225
2880 +	3	20	24	47	11,171	24,711
Census Division 15						
Under 3	27	3	11	41	3,786	32,922
3 - 9	57	3	12	72	7,600	60,640
10 - 69	104		8	112	13,366	52,698
70 - 239	1,162	1	75	1,238	152,429	172,264
240 - 399	2,474	22	250	2,746	545,288	563,203
400 - 559	1,627	19	227	1,873	591,714	680,225
560 - 759	1,454	35	324	1,813	695,077	816,575
760 - 1119	1,223	36	414	1,673	774,795	918,413
1120 - 1599	503	35	325	863	429,160	542,466
1600 - 2239	148	18	125	291	170,540	203,708
2240 - 2879	42	9	58	109	55,258	67,443
2880 +	47	25	68	140	67,419	93,706

SOURCE: Statistics Canada, 1966 Census of Canada. (Ottawa: DBS, 1966).

TABLE B.2

1961 CENSUS DATA

Size In Acres	Number of Farms	Hired Workers	Other Workers	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 1						
Under 3	7	7	11	25	2,220	9,755
3 - 9	7	11	17	35	4,819	15,473
10 - 69	25	37	90	152	14,142	68,266
70 - 239	113		22	135	21,163	37,724
240 - 399	226	4	45	275	53,838	86,797
400 - 559	210	7	39	256	63,758	121,530
560 - 759	232	4	58	294	89,394	140,216
760 - 1119	396	25	142	563	208,035	373,125
1120 - 1599	373	42	165	580	243,541	382,683
1600 - 2239	218	31	373	373	181,088	273,272
2240 - 2879	122	23	92	237	132,954	207,182
2880 +	215	271	365	851	408,539	657,542
Census Division 2						
Under 3	28	3	9	40	2,681	11,096
3 - 9	81	6	22	109	10,377	20,652
10 - 69	217	32	38	332	34,226	82,966
70 - 239	1,340	79	538	1,957	382,493	820,431
240 - 399	921	132	528	1,581	399,980	925,058
400 - 559	480	110	319	909	270,790	558,775
560 - 759	420	99	259	778	270,368	508,833
760 - 1119	435	120	299	872	387,487	685,924
1120 - 1599	324	87	224	635	335,883	569,044
1600 - 2239	187	103	196	486	247,019	431,292
2240 - 2879	80	46	96	222	131,078	217,236
2880 +	204	560	752	1,516	597,211	1,023,329
Census Division 3						
Under 3	18		1	19	947	1,913
3 - 9	31		3	34	2,757	3,155
10 - 69	81	2	14	97	10,510	13,828
70 - 239	314	4	47	365	53,530	92,034
240 - 399	430	7	73	510	114,193	160,544
400 - 559	342	151	77	434	132,431	169,412
560 - 759	389	18	103	510	191,654	283,891
760 - 1119	453	98	188	699	312,679	444,460
1120 - 1599	275	55	161	491	243,732	349,634
1600 - 2239	132	62	130	324	156,968	239,944
2240 - 2879	63	42	67	172	85,195	188,584
2880 +	118	488	602	1,208	474,799	572,874

1961 CENSUS (Continued)

Size In Acres	Number Of Farms	Hired Workers	Other Workers	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 4						
Under 3	1			1	54	34
3 - 9	4		1	5	469	4,070
10 - 69	3			3	342	413
70 - 239	53		5	58	5,176	18,999
240 - 399	142	1	13	156	15,980	27,708
400 - 559	132		16	148	22,173	40,161
560 - 759	171	2	25	198	37,278	66,843
760 - 1119	311	9	63	383	90,510	159,797
1120 - 1599	340	12	87	439	124,093	212,439
1600 - 2239	312	20	119	451	145,437	238,151
2240 - 2879	181	24	85	290	93,693	152,886
2880 +	476	214	410	1100	422,414	642,691
Census Division 5						
Under 3	8		1	9	533	787
3 - 9	28		3	31	2,851	7,561
10 - 69	67	3	10	80	8,491	32,300
70 - 239	314	6	41	361	44,935	89,653
240 - 399	612	9	110	731	151,551	260,144
400 - 559	627	29	157	813	240,448	428,921
560 - 759	755	70	246	1,071	377,384	673,596
760 - 1119	917	118	383	1,418	611,973	1,092,628
1120 - 1500	556	157	383	1,096	506,668	923,765
1600 - 2239	258	114	226	598	309,835	591,222
2240 - 2879	75	52	103	230	111,228	213,751
2880 +	116	292	386	794	296,105	561,045
Census Division 6						
Under 3	30	14	28	72	4,519	30,100
3 - 9	89	79	100	268	19,573	104,138
10 - 69	258	41	120	419	64,137	221,539
70 - 239	845	30	165	1,040	177,246	253,977
240 - 399	1,095	59	254	1,408	383,640	617,303
400 - 559	750	59	262	1,071	381,213	550,886
560 - 759	709	120	338	1,167	467,663	714,864
760 - 1119	545	144	368	1,057	462,789	772,019
1120 - 1500	277	148	281	706	314,843	534,613
1600 - 2239	115	93	162	370	176,115	278,251
2240 - 2879	44	80	95	219	-93,154	131,703
2880 +	81	136	399	616	284,021	559,020

1961 CENSUS (Continued)

Size In Acres	Number of Farms	Hired Workers	Other Workers	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 7						
Under 3						
3 - 9	14		1	15	1,041	2,701
10 - 69	40	2	3	45	4,235	9,632
70 - 239	380	3	39	422	40,296	76,227
240 - 399	831	8	127	966	147,186	243,313
400 - 559	803	21	166	990	198,815	333,183
560 - 759	851	25	205	1,081	266,054	435,488
760 - 1119	1,063	62	322	1,447	432,694	711,746
1120 - 1599	678	64	297	1,039	354,645	590,744
1600 - 2239	307	88	209	604	208,091	347,834
2240 - 2879	112	53	117	282	95,277	163,447
2880 +	120	142	217	477	155,520	265,643
Census Division 8						
Under 3	22	1	3	26	1,186	2,584
3 - 9	61	1	7	69	5,833	9,340
10 - 69	224	8	37	269	26,032	54,316
70 - 239	1,735	39	334	2,108	257,670	431,919
239 - 399	2,003	58	545	2,606	534,055	847,986
400 - 559	1,178	91	503	1,762	442,509	727,711
560 - 759	653	80	347	1,080	332,784	598,219
760 - 1119	456	105	345	906	306,271	522,871
1120 - 1599	161	69	197	417	150,473	323,859
1600 - 2239	42	43	72	157	52,163	106,724
2240 - 2879	9	22	29	60	13,970	20,579
2880 +	7	34	41	92	16,202	20,978
Census Division 9						
Under 3						
3 - 9	4			4	514	801
10 - 69	8		2	10	684	1,964
70 - 239	32		4	36	3,340	3,838
240 - 399	37		8	45	7,057	7,798
400 - 559	25	1	7	33	5,325	4,126
560 - 759	11		2	13	2,748	1,869
760 - 1119	18	2	7	27	7,121	8,941
1120 - 1599	9	2	7	18	4,395	5,449
1600 - 2239	7	2	5	14	4,573	7,251
2240 - 2879	5	1	5	11	3,441	3,601
2880 +	19	26	43	88	54,053	72,411

1961 CENSUS (Continued)

Size In Acres	Number of Farms	Hired Workers	Other Workers	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 10						
Under 3	18		3	21	1,249	1,745
3 - 9	61	1	6	68	4,561	6,358
10 - 69	165	3	27	195	14,668	33,536
70 - 239	2,055	9	382	2,446	253,697	365,641
240 - 399	3,168	35	911	4,114	686,921	1,004,042
400 - 559	1,989	53	763	2,805	603,473	913,198
560 - 759	1,233	44	555	1,832	473,778	744,595
760 - 1119	915	109	532	1,556	462,823	711,575
1120 - 1599	401	98	345	844	255,556	414,699
1600 - 2239	118	60	141	319	108,136	273,401
2240 - 2879	41	37	81	159	47,269	76,081
2880 +	24	48	64	136	36,660	56,248
Census Division 11						
Under 3	37	3	20	60	4,250	12,926
3 - 9	173	10	45	228	26,745	49,889
10 - 69	397	50	143	590	77,233	183,240
70 - 239	3,181	77	843	4,101	626,718	828,236
240 - 399	2,666	152	1,120	3,938	852,993	1,121,352
400 - 559	1,162	140	701	2,003	531,463	831,924
560 - 759	531	126	404	1,061	349,683	439,511
760 - 1119	273	81	279	633	210,376	294,948
1120 - 1599	70	43	109	122	102,310	129,840
1600 - 2239	12	16	23	51	15,900	45,902
2240 - 2879	5	9	17	31	11,120	18,987
2880 +	5	42	46	93	20,545	26,698
Census Division 12						
Under 3	23		2	25	1,370	7,244
3 - 9	57	3	23	83	4,912	27,992
10 - 69	113	1	22	136	7,274	12,444
70 - 239	1,058	2	240	1,300	97,083	125,403
240 - 399	1,418	8	489	1,915	231,559	336,857
400 - 559	896	17	398	1,311	194,459	286,239
560 - 759	506	20	291	817	136,319	192,718
760 - 1119	314	29	232	575	100,004	150,319
1120 - 1599	77	14	79	170	33,028	53,663
1600 - 2239	21	7	22	50	12,327	19,981
2240 - 2789	2			2	538	686
2880 +	9	1	6	16	10,344	2,855

1961 CENSUS (Continued)

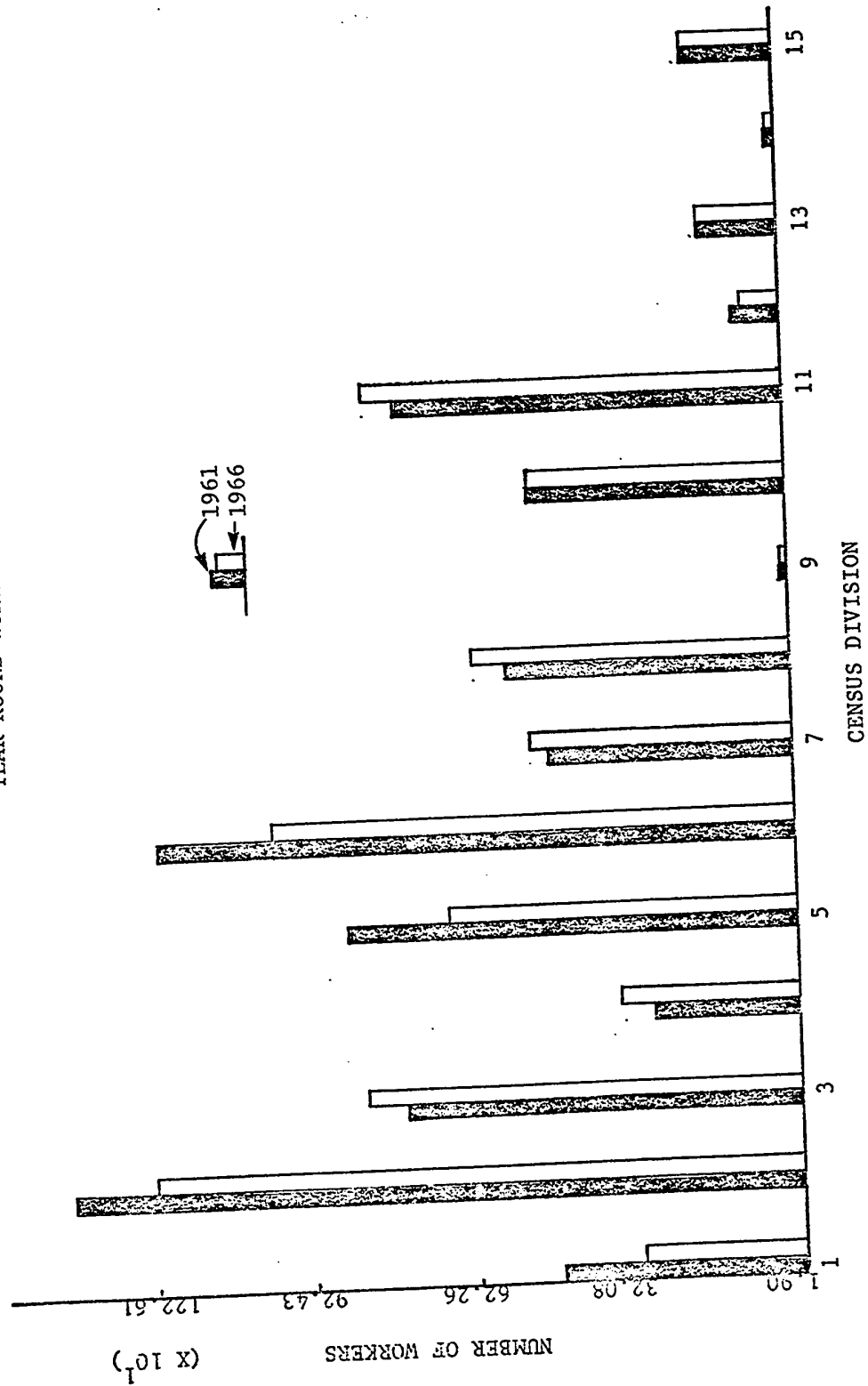
Size In Acres	Number of Farms	Hired Workers	Other	Total Workers	Total Capital Value X 100	Value Of Pro- ducts Sold X 10
Census Division 13						
Under 3	19	1	4	24	1,098	4,929
3 - 9	23		2	25	1,344	2,489
10 - 69	107	1	21	129	8,616	13,465
70 - 239	2,076	7	399	2,482	239,027	304,573
240 - 399	2,574	17	881	3,472	512,610	696,495
400 - 559	1,353	24	604	1,981	386,907	532,154
560 - 759	663	27	387	1,077	235,296	328,428
760 - 1119	397	40	286	723	177,832	268,631
1120 - 1599	80	19	83	182	51,133	74,999
1600 - 2239	22	7	34	63	20,900	24,998
2240 - 2879	3	1	5	9	3,080	2,661
Census Division 14						
Under 3						
3 - 9	3		1	4	200	121
10 - 69	14		1	15	1,631	597
70 - 239	337		67	404	30,941	30,611
240 - 399	331	4	106	441	47,075	54,960
400 - 559	145	1	66	212	29,257	32,878
560 - 759	75	3	49	127	20,172	27,933
760 - 1119	49	4	36	89	16,922	21,154
1120 - 1599	13		10	23	5,816	6,429
1600 - 2239	2			2	792	1,105
2240 - 2879	1			1	85	130
2880 +	1	7	9	17	9,700	4,685
Census Division 15						
Under 3	27		6	33	1,938	10,813
3 - 9	47	3	20	70	4,359	28,695
10 - 69	94	4	21	119	7,537	20,327
70 - 239	1,555	14	135	1,704	125,986	167,181
240 - 399	2,931	14	372	3,317	413,445	560,816
400 - 559	1,671	23	344	2,038	371,679	535,350
560 - 759	1,222	21	327	1,570	346,792	509,581
760 - 1119	937	32	349	1,318	350,096	496,391
1120 - 1599	335	33	234	602	173,222	247,676
1600 - 2239	89	18	91	198	60,275	88,166
2240 - 2879	23	13	30	66	19,660	36,562
2880 +	24	13	45	82	25,802	30,757

SOURCE: Statistics Canada, 1961 Census of Canada (Ottawa: D. B.S., 1961).

APPENDIX C

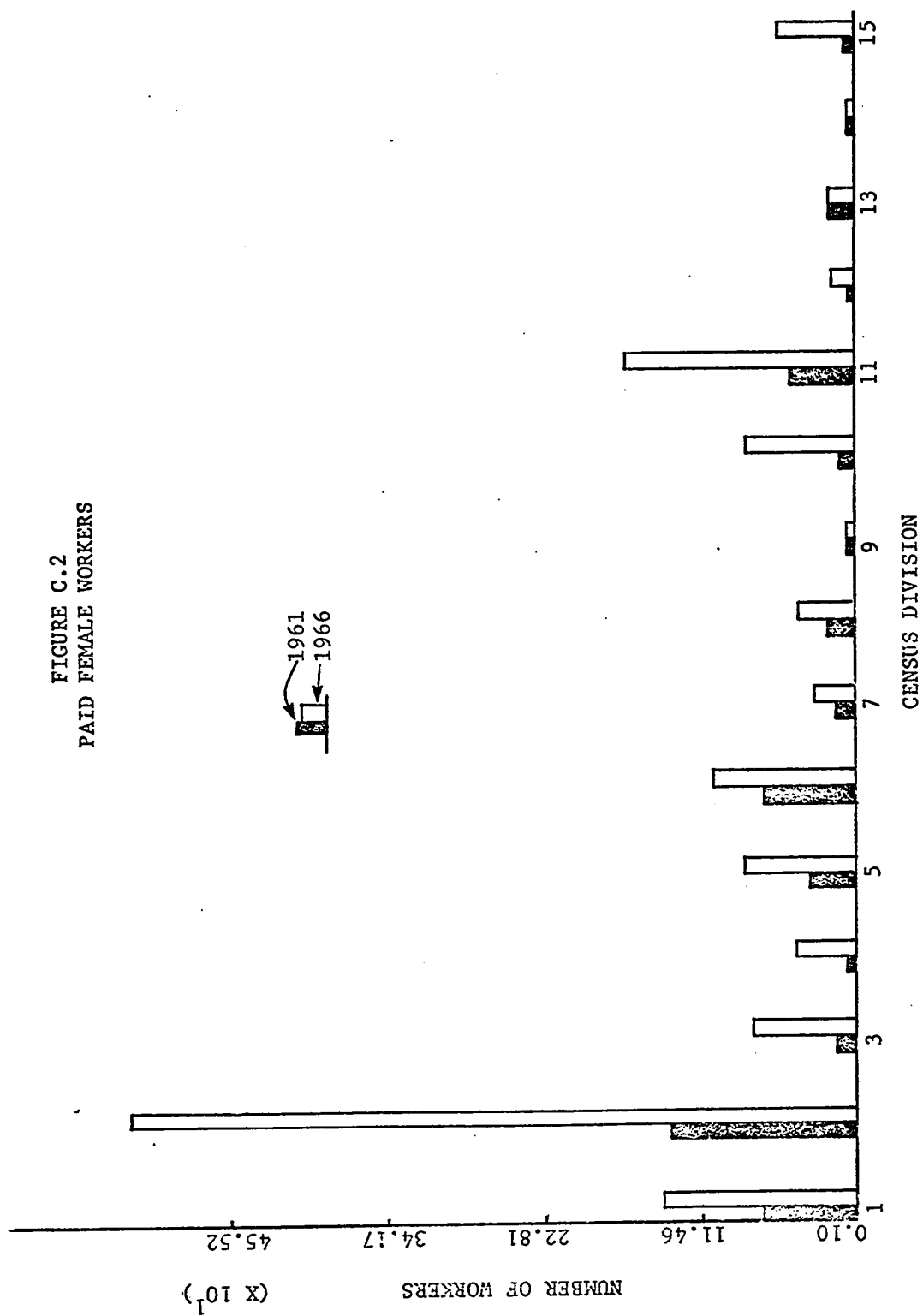
CHECK OF DATA CONSISTENCY

FIGURE C.1
YEAR ROUND WORKERS



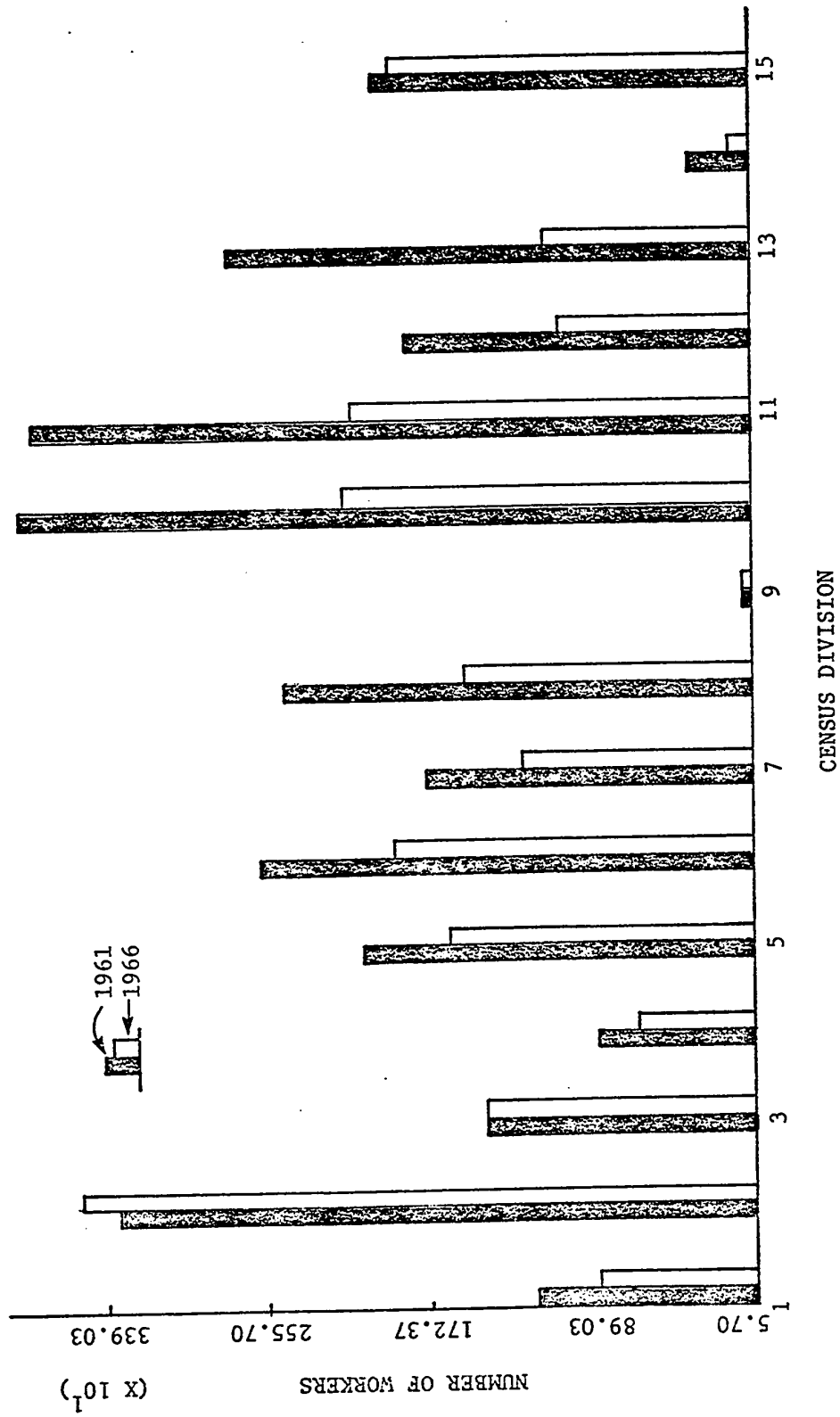
SOURCE: Statistics Canada, 1961 Census of Canada (Ottawa: D.B.S., 1961)
Statistics Canada, 1966 Census of Canada (Ottawa: D.B.S., 1966)

FIGURE C.2
PAID FEMALE WORKERS



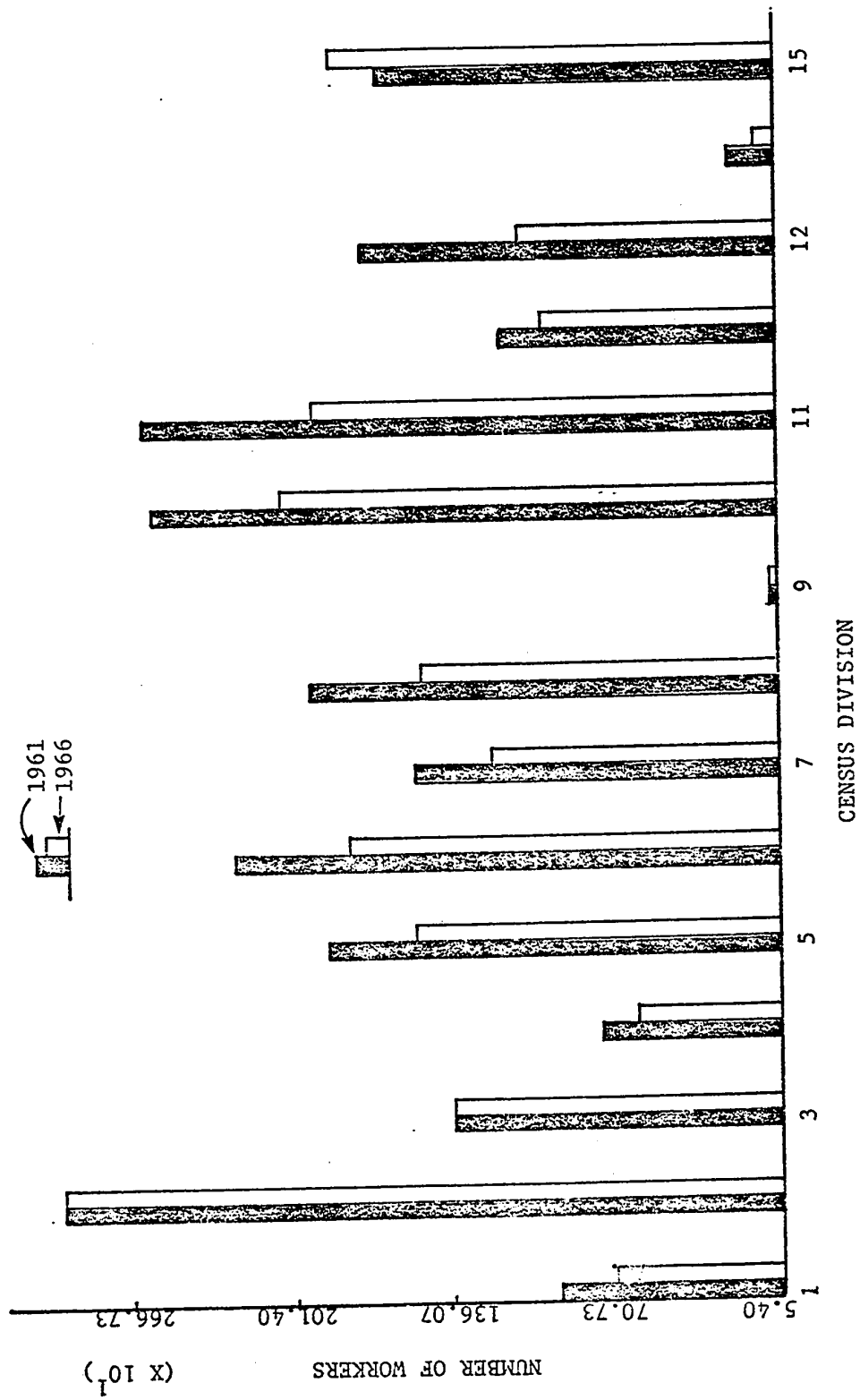
SOURCE: Statistics Canada, 1961 Census of Canada (Ottawa: D.B.S., 1961).
Statistics Canada, 1966 Census of Canada (Ottawa: D.B.S., 1966).

FIGURE C.3
TOTAL MALE AND FEMALE WORKERS



SOURCE: Statistic Canada, 1961 Census of Canada (Ottawa: D.B.S., 1961).
Statistic Canada, 1966 Census of Canada (Ottawa: D.B.S., 1966).

FIGURE C.4
MALE WORKERS ONLY



SOURCE: Statistics Canada, 1961 Census of Canada (Ottawa: D.B.S., 1961)
Statistics Canada, 1966 Census of Canada (Ottawa: D.B.S., 1966)

APPENDIX D

ALTERNATIVE ESTIMATIONS OF UNDEREMPLOYMENT

This appendix contains an attempt to check the consistency and accuracy of the figures obtained for underemployment. Two checks were employed.

(1) The first one used the average value of products sold to attempt to arrive at some underemployment figures. The procedure was as follows. The average value of products sold for each census division was compared to that for Census Division Five, which has the highest labor productivity and whose labor productivity was used as a proxy for "achievable labor productivity" in the main text, to arrive at a figure for underemployment.

(2) The second method was simply to divide each census division's total value of products sold by the labor productivity figure for Census Division Five. Then the formula $\frac{L'' - L}{L''} \times 100$ from the main text was used. The results of this analysis are shown in Tables E.1, E.2, and E.3.

APPENDIX E
PULP AND PAPER MILLS IN CANADA

TABLE E.1

UNDEREMPLOYMENT ESTIMATED FROM TOTAL VALUE OF PRODUCTS SOLD FOR 1966

Census Division	Average Value of Products Sold Per Farm		Underemployment %	Labor (man years)	Total Value of Products Sold (dollars)	T.V.P.S. ^a		$\frac{L'' - L}{L} \times 100^b$
	(dollars)	(1)				(2)	(3)	
Alberta	9,124	(1)	(2)	(3)	(4)	(5)	(6)	
C.D. 1	12,351	9,124	44	97,526	633,285,700	60,027	39	
C.D. 2	17,090	12,351	23	3,318	26,332,040	2,496	25	
C.D. 3	13,879	17,090	- 4	9,161	76,581,700	7,259	21	
C.D. 4	11,538	13,879	16	4,755	34,642,100	3,284	31	
C.D. 5	16,448	11,538	30	2,920	22,234,140	2,108	28	
C.D. 6	15,276	16,448	--	6,018	63,488,930	6,018	0	
C.D. 7	11,036	15,276	7	7,457	69,937,770	6,629	11	
C.D. 8	9,654	11,036	33	6,522	52,962,660	5,020	23	
C.D. 9	6,254	9,654	41	8,412	60,557,620	5,740	32	
C.D. 10	7,367	6,254	62	260	1,106,930	105	60	
C.D. 11	7,131	7,367	55	12,025	69,547,210	6,592	45	
C.D. 12	3,872	7,131	57	11,276	59,863,460	5,674	50	
C.D. 13	5,122	3,872	76	5,216	16,008,620	1,517	71	
C.D. 14	2,959	5,122	69	8,011	34,968,290	3,315	59	
C.D. 15	4,741	2,959	82	1,201	3,021,310	286	76	
		4,741	71	10,971	42,042,630	3,985	64	

^aThis column represents the optimum labor use in man years. It is the total value of products sold divided by \$10,550 (which is the total value of products sold divided by man years of labor for Census Division Five).

^bThis column is the percentage of underemployment in agriculture. It is calculated by subtracting corresponding figures in Column (5) from those in Column (3), then dividing by the figure from Column (3) and multiplying by 100.

TABLE E.2

UNDEREMPLOYMENT ESTIMATED FROM TOTAL VALUE OF PRODUCTS SOLD FOR 1961

Census Division	Average Value of Products Sold Per Farm		Underemployment %	Labor (man years)	Total Value of Products Sold (dollars)	T.V.P.S. ^a		$\frac{L'' - L}{L} \times 100^b$
	(dollars)	(1)				\$6,741.	(5)	
Alberta	5,997		47	110,660	439,024,600		65,128	41
C.D. 1	10,940		3	3,776	23,685,650		3,514	7
C.D. 2	12,365		-10	9,437	58,546,360		8,685	8
C.D. 3	9,563		15	4,863	25,302,730		3,754	23
C.D. 4	7,357		35	3,232	15,641,920		2,320	28
C.D. 5	11,252		0	7,232	48,753,730		7,232	0
C.D. 6	9,856		12	8,413	47,684,130		7,074	16
C.D. 7	6,116		46	7,370	31,799,580		4,717	36
C.D. 8	5,598		50	9,552	36,670,830		5,440	43
C.D. 9	6,746		40	299	1,180,490		175	42
C.D. 10	4,516		60	14,495	46,011,190		6,826	53
C.D. 11	4,680		58	12,911	39,834,530		5,909	54
C.D. 12	2,707		76	6,400	12,163,950		1,804	72
C.D. 13	3,093		73	10,220	22,646,840		3,360	67
C.D. 14	1,877		83	1,335	1,826,030		271	80
C.D. 15	3,051		73	11,117	27,323,150		4,053	64

^aThis column represents the optimum labor use in man years. It is the total value of products sold divided by \$6,741 (which is the total value of products sold divided by man years of labor for Census Division Five).

^bThis column is the percentage of underemployment in agriculture. It is calculated by subtracting corresponding figures in Column (5) from those in Column (3), then dividing by the figure from Column (3) and multiplying by 100.

TABLE E.3

COMPARISON OF ALL THE UNDEREMPLOYMENT PERCENTAGES CALCULATED

Census Division	1966			1961		
	Cobb Douglas	Average Value of Products Sold	Total Value of Products Sold Divided by Labor Product- ivity of Census Division Five	Cobb Douglas	Average Value of Products Sold	Total Value of Products Sold Divided by Labor Product- ivity of Census Division Five
Alberta	40	44	39	47	47	41
C.D. 1	20	23	25	5	3	7
C.D. 2	23	4	21	9	10	8
C.D. 3	30	16	31	22	15	23
C.D. 4	25	30	28	26	35	28
C.D. 5	-	-	-	-	-	-
C.D. 6	12	7	11	16	12	16
C.D. 7	23	33	23	36	46	36
C.D. 8	34	41	32	44	50	43
C.D. 9	48	62	60	54	40	42
C.D. 10	49	55	45	55	60	53
C.D. 11	53	57	50	56	58	54
C.D. 12	71	76	71	72	76	72
C.D. 13	61	69	59	68	73	67
C.D. 14	74	82	76	79	83	80
C.D. 15	66	71	64	65	73	64

