

THE INDICATOR APPROACH IN THE EXAMINATION OF SPATIAL
VARIATIONS IN THE LEVEL OF DEVELOPMENT OF NATIVES
AND THE CONCEPT OF DUALISM IN CANADA

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ABSTRACT

Regional development in Canada is uneven. However, it is less clear whether native development in Canada is similarly patterned as non-native development. As well, it is not evident whether variations exist in the differences between the level of development of native and non-native people in different regions of Canada.

Development is a multi-dimensional process involving economic and social change. The primary purpose of this thesis is to examine the use of the indicator approach to create a measure of development which encompasses both the economic and social dimensions of development. The secondary purposes of the thesis are: (1) to use the indicator approach to compute a measure of development to identify spatial variations in the level of development of native people in Canada in 1981, and (2) to use development indicators to examine the spatial variations in the concept of dualism as it applies to native and non-native residents of Canada.

The data source for this analysis is the 1981 Native Summary Tape, a special tape produced by Census Canada containing a multitude of socio-economic data for natives and non-natives at the national, provincial, census division and census sub-division level. The primary statistical technique used in the computation of the development measures is principal components analysis. The development measures are computed at the census division level and mapping aids in the identification of the spatial patterns.

The results from this analysis suggest that the indicator approach to measuring development presented in this thesis is a valuable tool in the identification of spatial variations in development. This is an important procedure for researchers who wish to examine development in its socio-economic totality. Native development and dualism between native and non-native Canadians do vary spatially. The general pattern is higher native development and lower dualism between natives and non-natives in the larger urban centers and in central Canada.

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1. INTRODUCTION

1.1 Problem Statement

Studies of development, such as Myrdal (1957) and Hirschman (1958), first began appearing in the 1950's. One problem relating to the study of regional development has always been how to measure the concept of development. A measure of development is necessary in order to examine spatial variations in the level of development between and within nations and in changes in overall development over time. The primary objective of this thesis is to examine the use of the indicator approach to create a measure of development encompassing both the economic and social dimensions of development.

One of the major social questions facing Canadians is the plight of its native citizens. This thesis uses the indicator approach to measuring development to examine the issues of native development/underdevelopment across Canada and the differences in the developmental conditions of native and non-native peoples. Therefore, it deals with important national issues of immediate social concern and utilizes an important approach to regional analysis, development indicators.

Native peoples have, in the past, successfully adapted to new working environments. More recently, native Canadians have had to adjust quickly to rapidly changing circumstances, including the dominance of the Canadian industrial society. In the process of this adaptation, some signs of positive development have occurred among natives living in certain places while others, such as those living on the Grassy Plains Reserve, are noted for their social and economic deprivation (Shkilnyk, 1985).

The secondary objectives of this thesis are:

1. to use the indicator approach to compute a measure of development to identify the spatial variations in the level of development of native peoples in Canada in 1981;
2. to use development indicators to analyze the spatial variations in the differences between the level of development of natives and non-natives

within census divisions in Canada;

The relevance of the research lies in three basic areas. First, the use of development indicators at a regional level to examine the level of development of native peoples in Canada. The need for this type of analysis was indicated by Baster who noted: "in order to explore further interrelation between economic and non-economic factors in development it is important to ... go beyond national data to the analysis of interrelations at the regional and local level." (Baster, 1972, p. 14). Previously, the use of development indicators has been predominantly at the international level for comparing the developmental level of various nations throughout the world. This thesis should advance the use and methodology of the indicator approach to measuring regional development.

Second, if spatial variations are found in the level of development of natives in Canada, the mapping of these spatial variations may portray an identifiable geographical pattern and provide evidence as to the processes which have resulted in this spatial pattern. Therefore, the spatial pattern itself may have implications for regional development theory.

Third, the differences in the level of development between native and non-native Canadians living in the same region reflects the level of dualism between the two groups. The indicator approach is used to identify spatial variations in the level of dualism between native and non-native peoples and this thesis should provide a rethinking of the concept of dualism as it applies to natives and non-natives in Canada. Key elements of dualism are examined with respect to the levels of dualistic conditions found in census divisions in Canada.

The second chapter of this thesis focuses on the use of the indicator approach to measure development. The purpose and operationalization of the indicator approach is discussed in this chapter and several past research efforts using the indicator approach are reviewed. The third chapter examines the methodology utilized in the thesis. The first of the four major areas discussed in this chapter is the data source used for the analysis. The criteria for variable selection and a

discussion of the variables used in the analysis are also found in this chapter. Finally, the statistical technique used to establish the overall measures of development is presented, including a discussion of its main attributes.

The results of the analysis of native development in Canada are presented in the fourth chapter. The spatial variations in the level of development of natives are mapped and the resulting pattern is discussed. As well, the census divisions where the most and least developed natives in Canada reside are identified. The fifth chapter examines the results of the analysis of the spatial variations in the level of dualism between native and non-native Canadians.

1.2 Definition of Development

Development is a multi-dimensional process involving economic, social and political change. This change is usually associated with an increase in the standard of living and improvements in the well-being of the population. Neo-classical social scientists often relate this process to modernization which stresses the importance of the transfer of technology and infrastructure such as roads, hospitals and administrative offices to developing nations. The opposite paradigm, suggested by neo-marxist social scientists, see this process leading to underdevelopment. Members of this school of thought suggests that this is a condition caused by development rather than a process. Neo-marxist social scientists feel that the capitalistic process of development actually keeps developing nations poor because of the economic, social and political relationship between the countries are controlled by the developed nations. This relationship is often referred to as the Center/Periphery model.

1.3 Main Theories of Development

There are essentially two theoretical perspectives to the study of development. Neo-classical theories of development have, for the most part, grown out of Perroux's work on growth poles which originated with the observation that growth does not appear everywhere at the same time, but rather it becomes manifest at points or poles of growth and with variable intensity it spreads through different

channels, with variable terminal effects on the entire economy. Neo-classical theorists, such as Hansen, have suggested that development (whether spontaneous or induced) in a relatively few dynamic sectors and geographic clusters will spread over time to the rest of the spatial system. The identification and characteristics of the propulsive industries is the focus of such neo-classical theories as economic base, export base, staple theory and cumulative advantage (North, Isard, Innes and Perloff). The relationship between these core regions and the peripheral areas including the spread of development have been the focus of theorists such as Boudeville, Hansen, Hirschman and Myrdal.

The neo-marxist perspective of development suggests that the relationship between developed and developing nations is such that the developing nation is in a disadvantaged position. Marxist authors feel that imperialism is simply an expansion of capitalism beyond the national boundaries of a specific country and that imperialism is a necessary response by capitalists to preserve the ability to extract a return on investment once opportunities at home were no longer available. Marxists suggest that imperialism is not only necessary for capitalists but it is also a pre-condition for establishing a class struggle in each region of the world, leading eventually to a revolution of the proletariat and the establishment of socialist order.

Eventually, Marxist writers began to abandon the idea of the world wide spread of capitalist development and Frank in 1967 suggested that development is permanently blocked in certain regions because of the relationship with the international economic system. This began the *dependency school* of Marxist thought which saw the world being integrated into the capitalist economic system but rather than developing the periphery, this process leads to the draining of surplus value into the core area. Thus the capitalist system creates underdevelopment as a permanent condition in some regions as benefits generated in these regions are drained back to the core.

The indicator approach examined in this thesis, although not directly related to either theoretical perspective, has most often been associated with the neo-classical perspective.

2. MEASURING REGIONAL DEVELOPMENT

Problems relating to the measurement of development, in part, stem from the lack of a clear and widely accepted definition of development. In the past, development was viewed as a process of economic change which could be measured in terms of national economic growth. The problem of equating development with economic growth was apparent in many early publications on development including Williamson (1965), Gupta (1971) and Kuznets (1972). In these papers and many others, spatial variations in development were identified by differences in per capita GNP or per capita growth rate.

More recently, development has been viewed as a multi-dimensional process involving economic, social and political change (Baster, 1972, p. 1). The reason for this change of focus in the study of development suggested by Drewnowski (1974, p. 96) is that:

As the aim of all economic activity is to improve the conditions in which people live, this means that we have stopped half-way in assessing the consequences of development. To obtain a complete picture of development it is not sufficient to realize the amount of resources brought about by economic growth. It is also necessary to examine the impact of these resources on the life of the people.

In other words, increases in per capita GNP cannot show whether living conditions have actually improved. A classic illustration of this point is the oil-rich nations of the Middle East where rapid increases in GNP/capita have not resulted in significant improvements in the health or education levels of the population (World Development Report, 1984, pp. 219, 263 and 267).

It is clear from the above discussion that development encompasses not only economic improvement but also the way in which that improvement translates into improvements in the living conditions or well-being of the population. A measure of development must therefore encompass both the economic improvements of a population and the level of well-being of that population in terms of social attributes such as education.

The indicator approach to measuring development combines the three dimensions of the development process, economic, social and political, into one measure. This measure of development should reflect the complexity of these three contributing factors. Research to date on development indicators has been conducted almost exclusively at the international scale. The two major contributors to the research on development indicators are the Organization for Economic Co-Operation and Development (OECD) and the United Nations Research Institute for Social Development (UNRISD) as well as several individual scholars such as Adelman and Morris (1965), Baster (1972), Berry (1961), Smith (1977), Morris (1979) and Horn (1980).

2.1 The Purpose and Operationalization of Development Indicators

Development indicators may be used for a number of purposes. They may be used to describe trends and diagnose development levels in a particular region and compare these to other regions. They may be used to examine differences in the interrelations between variables in different regions. Finally, they may be used for prediction and planning, both for measuring targets and objectives and for evaluating progress.

Development indicators may be disaggregated, representative, or composite. The first variety is created when the complex nature of development is broken down into components and indicators are provided for each component part. The second type, representative indicators, occur when the research focuses on which of several indicators "best" measure a particular phenomena. For example, if an overall development indicator is desired and one component is the education level of the region, then literacy, secondary school enrolment or post-secondary enrolment ratios may be examined to determine which best reflects education levels in the region. This analysis is usually done on the basis of correlation analysis (McGranahan, 1972, p. 94). Composite indices are when a single indice is constructed by combining several indicators. In an attempt to find an overall measure of development, a composite indice is used in this analysis.

The operationalization of development indicators may be approached from two directions. The first is to start with an existing collection of relevant data and then begin to look for some systematic relations between the variables to construct a development indicator. In this case, the researcher is constrained by the available data and must construct his indicators within the framework of what data are available. The second approach is to begin with a conceptual model of the components of development which are important with reference to the economic, social and political dimensions. The researcher may then go out and collect the data with the framework for the dimensional indicators already having been established.

2.2 Past Research in Development Indicators

One of the earliest and most significant research efforts was completed by Adelman and Morris in 1965. The purpose of their study was to gain more precise empirical knowledge about the interdependence of economic and non-economic (particularly institutional) aspects of the development process (Adelman and Morris, 1965, p. 556). Their study attempted to provide insights into the behaviour of a range of variables considered by sociologists and political scientists to play an important role in development, and yet were not usually dealt with systematically because of difficulties with quantification. Data on forty-one social and political variables for seventy-four countries were collected and broken down on the basis of: (1) variables which were strictly quantitative, (2) variables which were based on both quantitative and qualitative data, and (3) entirely qualitative variables. Factor analysis was performed on the forty-one variables establishing four factors, which were then regressed against per capita GNP.

The four factors established were described by Adelman and Morris as:

1. the processes of change in attitudes and institutions associated with the breakdown of traditional social organization;
2. variations among political systems in countries;
3. the character and nature of leadership strategies; and

4. social and political stability.

These four factors accounted for 73% of the variance in the original data matrix. When these factors were regressed against per capita GNP, 66% of the variance in GNP was accounted for. The importance of this paper to development indicator research was the establishment of the empirical tie between the social and political processes in development and the purely economic aspect of development (per capita GNP). As well, these findings indicate the value of factor analysis over hypothesis testing techniques in the exploration of the wider interactions between variables involved in the development process (Baster, 1972, p. 13).

Another research effort which merits mention is the work of Morris David Morris. The purpose of Morris' work was not to establish a measure of development which captured everything about the development process in a single measure, but rather to identify certain conditions which had to be satisfied if a region was deemed successful in addressing the needs of its very poorest people (Morris, 1979, p. 3). The assumption being that the ability to care for its poor is a characteristic of highly developed nations.

The construction of Morris' index was based on three indicators: (1) life expectancy at age one, (2) infant mortality and (3) literacy rates. The values for life expectancy at age one and infant mortality were scaled into a 1 to 100 scale on the basis of highest and lowest expected values and literacy, measured as a percentage, was already on a 1 to 100 scale. Therefore, all three indicators were in the same scale making the construction of a composite index simpler. The composite index was computed as the average of the three indicators resulting in the final measure also being on a 1 to 100 scale. The results of this analysis is provided in Table 1 which reveals the ten most developed nations of the 150 original on the basis of both Morris' physical quality of life index (PQLI) and per capita GNP. It would appear that although the lists are similar, the PQLI is closer to what one would intuitively expect because the oil rich nations are not rated as having the top levels of development.

Table 1 Most Developed Nations for PQLI and GNP/capita, 1970

Country	PQLI	Country	GNP/capita
1. Sweden	97	1. United Arab Emirates	\$14,368
2. Norway	96	2. Kuwait	\$13,787
3. Iceland	96	3. Qatar	\$11,779
4. Denmark	96	4. Switzerland	\$8,569
5. Japan	96	5. Sweden	\$7,668
6. Netherlands	96	6. United States	\$7,024
7. Switzerland	95	7. Denmark	\$6,606
8. Canada	95	8. Canada	\$6,527
9. United Kingdom	94	9. Germany, Fed. Rep.	\$6,507
10. United States	94	10. Norway	\$6,221
150. Guinea - Bissau	12	150. Kampuchea	\$70

Source: Morris, 1979, pp. 138 - 145

The importance of this study relates to the use of three non-economic indicators in a measure of development. These results also reveal that sudden changes in GNP/capita such as those experienced by oil-rich Middle East countries may not result in improvements in the social or political conditions of the nation. These nations although having high GNP/capita do not have high enough social conditions to rate at the top of Morris' PQLI.

As noted in the introduction to this section, one of the important contributors to development indicator research has been the United Nations Research Institute for Social Development (UNRISD). This institute has released several papers on development indicators and one of their research efforts is briefly reviewed here. This particular study was intended as an exploratory study of ways of analyzing

and measuring development in its combined economic and social aspects (Baster, 1972, p. 11). It was concerned with: (1) the selection of the most appropriate indicators of socio-economic development, (2) the analysis of the relationships between these indicators at different levels of development, and (3) the construction of an overall index of development which is more sensitive and representative to general development levels than is per capita GNP.

This study began with 73 social and economic variables and then through a system of eliminations reduced these to the eighteen most significant variables. The selection was done on the basis of the strength of the correlation coefficients and the maintenance of some balance between the number of variables representing the economic and social dimensions of development. The assumption of this method is that highly correlated variables are better development indicators than variables with low correlations because, as McGranahan, the director of UNRISD, suggests, quality indicators should not only be a good indicator of a component of development but be well correlated with wide range of development components (McGranahan, 1972, p. 94). His reasoning is that the degree of complexity and interdependency in the development process justifies such assumptions. The final eighteen variables included nine economic and nine social variables (Table 2).

Initially in this analysis "correspondence points" were calculated for the original eighteen variables. For example, at what value of infant mortality did the average number of persons per room equal two. By this method the variables were rescaled to a 1 to 100 scale with the variables assuming a value of 1 for the lowest level of correspondence points and 100 for the highest correspondence points. A general index of development was constructed by combining the eighteen variables after weighting each variable by the degree of correlation of that variable with the other eighteen variables at each level of development. This portion of the analysis seems a bit suspect as it is not clear on what basis the countries used were divided into different levels of development. However, the overall index developed was found to more highly correlate with several individual economic and social variables than per capita GNP.

Table 2 Economic and Social Variables in UNRISD Study, 1970

=====

Social Variables

1. Expectation of Life at Birth
2. Percent of Population in locations of 20,000 and over
3. Consumption of animal protein, per capita, per day
4. Combined primary and secondary enrollment
5. Vocational enrollment ratio
6. Average number of persons per room
7. Newspaper circulation per 1,000 population
8. Fertility rate
9. Infant mortality rates

Economic Variables

10. Percent economically active population in utilities
 11. Agricultural production per male agricultural worker
 12. Percent adult male labour in agriculture
 13. Electricity consumption, kWh per capita
 14. Steel consumption, kg per capita
 15. Energy consumption, kg of coal equivalent per capita
 16. Percent GDP derived from manufacturing
 17. Foreign trade per capita, in 1960 U.S. dollars
 18. Percent wage earners to total economically active population
- =====

Brian Berry undertook another research effort on development indicators which appeared in the 1961 book of Norton Ginsburg. In this book, Berry compiled data on 43 social and economic variables for 95 countries. Factor analysis was then conducted on the data set to reduce the matrix from a 95 X 43 data matrix to a 95 X 4 matrix (Berry, 1961, p. 110). Rather than using the actual values for each variable, Berry used the rank of the variable for each country. In other words, all the countries were ranked according to the value for each variable and the factor analysis was conducted on the ranks. Berry justified this procedure by suggesting that due to differences in data collection between nations, more "faith" could be placed in the relative position of each country than in the actual values.

The first of the four factors established by Berry, from the original 43 variables, was identified as a "technological" scale. This factor included variables of transportation, accessibility, urbanization and technology. The second factor was identified as a "demographic" scale and included birth and death rates, population density and population per cultivated land unit. The third factor was called "a contrast in income and external relations". This factor was a collection of variables such as national product, energy consumption, per capita foreign trade and per capita international mail flows. The final factor was a left over category and seems to separate countries on the basis of the "size" of the country. Almost all of the variables in this factor related to per capita and per unit area measures. Additional analysis by Berry involved cluster analysis to group the countries on the basis of the factor scores.

Berry concluded that analysis of this type revealed some of the patterns which were involved in the development process. He suggests that the reduction of 43 indicators to four factors results in a much clearer understanding of the level of development of the countries involved.

The final research to be examined is the 1977 work by David Smith. Smith combined the work of Adelman and Morris and Brian Berry in the sense that he wished to establish an overall measure of development like Berry but wanted to incorporate political and social variables similar to Adelman and Morris. Smith

attempted to establish an overall socio-economic development measure for the forty-eight states of the continental United States, which unlike many other previous research efforts examined regional variations in development within one country as opposed to international comparisons. Smith used a similar methodology as found in this thesis by completing principal components analysis on 47 socio-economic variables.

Smith classified his variables into six major groups which he identified as: (1) income, wealth and employment; (2) the environment (housing); (3) health; (4) education; (5) social order; and (6) social belonging. Smith, again similar to this thesis, used choropleth maps as well as continuous three-dimensional surface maps to display the results of his analysis.

In an earlier work, Smith (1972) also used the same methodology for a study of the city of Tampa Bay. Census tracts were the areal unit used in this study and similar variables as the national analysis were used although data availability altered variable selection to a degree.

3. METHODOLOGY

This chapter presents the methodology used in this thesis to establish an overall measure of development by using the indicator approach. The first of the four major sections in this chapter examines the data source for the analysis. The selection of the socio-economic variables to be used in this analysis is discussed in the second section. The third section of the chapter examines each of the specific variables in the analysis in detail and reviews the relationship between each of these variables and development. In the final section of this chapter, the statistical technique used in this thesis, principal components analysis, is discussed and some of the advantages of this method over other previously used approaches to computing an overall indicator of development are presented.

3.1 Data Source

The analysis in this thesis utilizes the Native Summary Tape, a special tape produced by Census Canada. This tape provides a multitude of socio-economic data for natives and non-natives at the national, provincial, census division and census sub-division levels. The Native Summary Tape was first produced in 1981 and is the only available national data which differentiates between native and non-native residents of Canada. The census includes all Status Indians, Non-Status Indians, Metis and Inuit as native for the Native Summary Tape.

For this analysis, measures of development are computed at the census division level. Census divisions are used because: (1) there are enough natives in most census divisions that suppression is not as large of a problem as for census sub-divisions, (2) there is a significant amount of variation in the socio-economic conditions among census divisions in any one province, and (3) aggregation upwards to provincial or regional levels is a simpler procedure than the reverse. Table 3 provides a breakdown of the number of census divisions which apply to this research in each province and territory.

The number in brackets in Table 3 indicates the total number of census divisions in each province and territory. There are 140 census divisions out of a

Table 3 Census Divisions by Province

Province/Territory	No. of Census Divisions	No. of Native Peoples	% of Native Peoples in this Analysis
Newfoundland	1 (10)	4,430	53.5%
Prince Edward Island	0 (3)	625	0.0%
Nova Scotia	4 (18)	7,790	65.6%
New Brunswick	4 (15)	5,515	68.2%
Quebec	20 (76)	52,390	90.9%
Ontario	35 (53)	110,055	96.6%
Manitoba	17 (23)	66,280	98.8%
Saskatchewan	14 (18)	59,195	98.9%
Alberta	11 (15)	72,050	98.7%
British Columbia	28 (29)	82,640	99.6%
Yukon/N.W.T.	6 (6)	30,475	100.0%

Note: The number in brackets indicates the total number of census divisions in each province and territory.

total of 266 census divisions in Canada which meet the minimum requirement of 500 native people for self-enumeration areas and 100 people for canvasser areas. As a comparative note, only 353 out of 5710 census sub-divisions in Canada are included on the Native Summary Tape because of the suppression rules (Native Summary Tape Documentation, 1981). Figure 1 is map of the census divisions of Canada with the shaded area indicating those census divisions applicable to this research.

3.2 Variable Selection

The selection of variables to use in the analysis is a critical feature of the

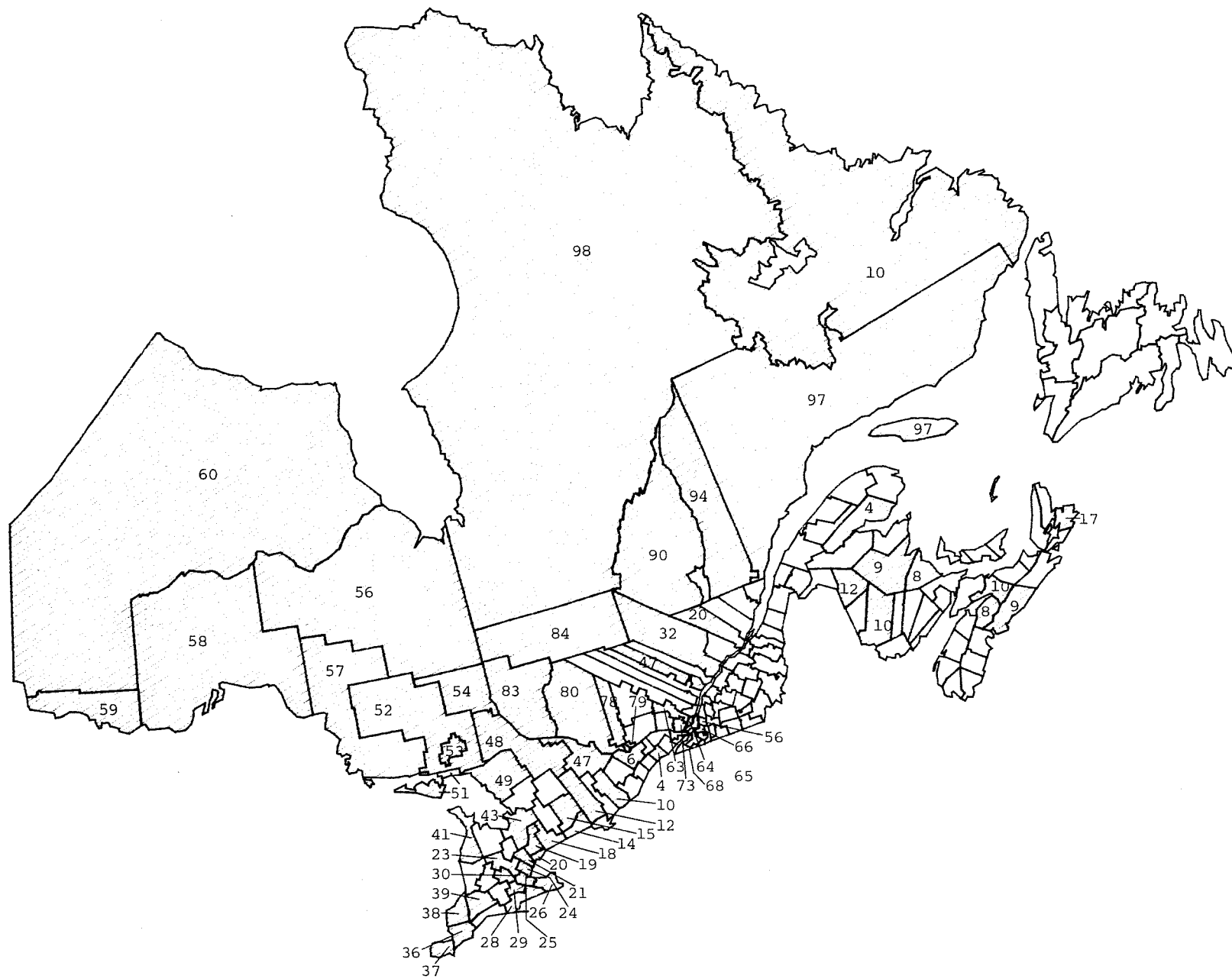
Applicable Census Divisions

Figure 1(a)



Applicable Census Divisions

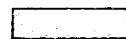
Figure 1(b)



Data



Inapplicable



Applicable

Legend of Applicable Census Divisions

Atlantic Region

- | | |
|------------------------------|--------------------------------|
| 10 Division No. 10 (Nfld.) | 8 Kent County (N.B.) |
| 8 Hants County (N.S.) | 9 Northumberland County (N.B.) |
| 9 Halifax County (N.S.) | 10 York County (N.B.) |
| 10 Colchester County (N.S.) | 12 Victoria County (N.B.) |
| 17 Cape Breton County (N.S.) | |

Quebec

- | | |
|--------------------|---------------------------------|
| 4 Bonaventure | 73 Deux-Montagnes |
| 20 Quebec | 78 Gatineau |
| 32 Champlain | 79 Hull |
| 47 Maskinonge | 80 Pontiac |
| 56 Chambly | 83 Temiscamingue |
| 63 Terrebonne | 84 Abitibi |
| 64 Ile-Jesus | 90 Lac-Saint-Jean-Ouest |
| 65 Ile-de-Montreal | 94 Chicoutimi |
| 66 Laprairie | 97 Saguenay |
| 68 Huntingdon | 98 Territoire-du-Nouveau-Quebec |

Ontario

- | | |
|-------------------------------------|----------------------------------|
| 4 Stormont County | 36 Kent County |
| 6 Ottawa-Carleton Regional Munic. | 37 Essex County |
| 10 Frontenac County | 38 Lambton County |
| 12 Hastings County | 39 Middlesex County |
| 14 Northumberland County | 41 Bruce County |
| 15 Peterborough County | 43 Simcoe County |
| 18 Durham Regional Municipality | 47 Renfrew County |
| 19 York Regional Municipality | 48 Nipissing District |
| 20 Toronto Metropolitan Municipal. | 49 Parry Sound District |
| 21 Peel Regional Municipality | 51 Manitoulin District |
| 23 Wellington County | 52 Sudbury District |
| 24 Halton Regional Municipality | 53 Sudbury Regional Municipality |
| 25 Hamilton-Wentworth Regional Mun. | 54 Timiskaming District |
| 26 Niagara Regional Municipality | 56 Cochrane District |
| 28 Haldimand-Norfolk Regional Mun. | 57 Algoma District |
| 29 Brant County | 58 Thunder Bay District |
| 30 Waterloo Regional Municipality | 59 Rainy River District |
| | 60 Kenora District |

Manitoba

- | | |
|------------------|--------------------|
| 1 Division No. 1 | 16 Division No. 16 |
| 2 Division No. 2 | 17 Division No. 17 |
| 6 Division No. 6 | 18 Division No. 18 |

7 Division No. 7
 8 Division No. 8
 9 Division No. 9
 11 Division No. 11
 13 Division No. 13
 15 Division No. 15

19 Division No. 19
 20 Division No. 20
 21 Division No. 21
 22 Division No. 22
 23 Division No. 23

Saskatchewan

1 Division No. 1
 5 Division No. 5
 6 Division No. 6
 7 Division No. 7
 9 Division No. 9
 10 Division No. 10
 11 Division No. 11

12 Division No. 12
 13 Division No. 13
 14 Division No. 14
 15 Division No. 15
 16 Division No. 16
 17 Division No. 17
 18 Division No. 18

Alberta

2 Division No. 2
 3 Division No. 3
 5 Division No. 5
 6 Division No. 6
 8 Division No. 8
 10 Division No. 10

11 Division No. 11
 12 Division No. 12
 13 Division No. 13
 14 Division No. 14
 15 Division No. 15

British Columbia

1 East Kootenay Regional District
 3 Central Kootenay Reg. District
 7 Okanagan-Similkameen Reg. Dist.
 9 Fraser-Cheam Regional District
 11 Central Fraser Valley Reg. Dist
 13 Dewdney-Alouette Reg. District
 15 Greater Vancouver Reg. District
 17 Capital Regional District
 19 Cowichan Valley Reg. District
 21 Nanaimo Regional District
 23 Alberni-Clayoquot Reg. District
 25 Comox-Strathcona Reg. District
 27 Powell River Regional District
 29 Sunshine Coast Regional District

31 Squamish-Lillooet Reg. District
 33 Thompson-Nicola Reg. District
 35 Central Okanagan Reg. District
 37 North Okanagan Regional District
 39 Columbia-Shuswap Reg. District
 41 Cariboo Regional District
 43 Mount Waddington Reg. District
 45 Central Coast Regional District
 47 Skeena-Queen Charlotte Reg. Dist.
 49 Kitimat-Stikine Reg. District
 51 Bulkley-Nechako Reg. District
 53 Fraser-Fort George Reg. District
 55 Peace River-Liard Reg. District
 57 Stikine Region

Yukon and the Northwest Territories

1 Yukon
 4 Baffin Region
 5 Keewatin Region

6 Fort Smith Region
 7 Inuvik Region
 8 Central Arctic Region

development indicator approach. As was noted in the previous section, the operationalization of development indicators depends initially on the data source. The Native Summary Tape is used in this analysis which constrains the potential variables to those variables collected by Census Canada, although this is not a major problem because of the wide range of social and economic variables collected by the census. However, the way in which the data is compiled can cause difficulties. For example, the income variable is presented in categorical form which constrains the analysis to the categories chosen by Statistics Canada.

The second factor affecting the variable selection is the type of analysis being completed. Indicators may be used in three general ways: (1) for a theoretical analysis of the development process, (2) for planning and program evaluation, and (3) for a general evaluation of developmental conditions. The selection of the variables may vary with the type of analysis. In this case, the third type of analysis is being used so a wide range of socio-economic variables is desired to determine the general conditions. The difference between a general evaluation of developmental conditions and the first, more theoretical approach, is that a theoretical use of indicators is more concerned with the underlying processes of the interrelations among the various variables than is this analysis.

In establishing an overall measure of development for native peoples in Canada, the widest possible range of social and economic variables is desired. Attempting to include every variable considered part of development and the well-being of the population is impossible. Instead, as noted by Smith, the researcher includes all available variables with a sufficient level of societal consensus as ingredients of well-being or development (Smith, 1977, p. 268). The specific variables included in this analysis were chosen on the basis of literature on development, as discussed in the next section, and data availability as constrained by the Native Summary Tape. Variables reflecting areas such as income, education, employment, housing quality and family structure are included in the analysis. The fifteen specific socio-economic variables are provided in Table 4.

In the introduction, it was suggested that development has recently been more

Table 4 Variables Used in the Analysis

-
1. Percentage of Labour Force who are Unemployed
 2. Percentage of 15 - 64 Year of Age in the Labour Force
 3. Percentage of those over 5 Years of Age who are Migrants
 4. Percentage of Total Families who are Lone Parent
 5. Percentage of over 15 Years of Age without Any Income
 6. Percentage of those over 15 Years of Age with Less than Grade 8
 7. Average Income over 15 Years of Age who Have an Income
 8. Percentage of Population who are Less than 20 Years of Age
 9. Percentage of Households with > Seven Persons per Bathroom
 10. Percentage of Households Requiring Major Repairs
 11. Percentage of Households Speaking English or French
 12. Percentage of Households with a Central Heating System
 13. Percentage of those over 15 Years of Age with < \$2000 Income
 14. Percentage of Households who have been Resident for > 5 Years
 15. Number of Births per 1000 Population in 1981
-

commonly viewed as a multi-dimensional process involving social and political change as well as economic improvements. The political dimension to development can not be underrated at the national scale. However, in assessing spatial variations in the level of development of a portion of the population living within a developed nation, the political dimension loses its importance. Native people in Canada all live within the same political system resulting in no spatial variations in the political variables used by Adelman and Morris (1965) such as the extent of political stability and the political strength of the military.

As noted previously, Morris tried to construct his measure of development by measuring the ability of each nation to care for the very poorest portion of the population. A similar approach is used in this analysis. The overall development of natives living in a census division will be assessed by the proportion of natives in that census division living at the *lowest* level of development. The variables selected focus on the proportion of residents in each census division with poor socio-economic conditions. In other words, the proportion of native people with less than a Grade 8 education is deemed to be more pivotal to general developmental conditions than the proportion who have graduated from university. The same line of reasoning suggests that the proportion with low income levels is more critical to general developmental conditions than the proportion with high incomes.

A brief description of some of the variables may be useful at this point in order to better understand the further analysis.

3.3 Discussion of Variables

The unemployment variable and the proportion of residents 15 - 64 years old in the labour force measure two related but separate phenomenon. Initially, the population 15 - 64 years old are divided into those in the labour force and those who are not in the labour force. To be considered in the labour force, a person had to be either presently employed or unemployed under the Statistics Canada definition. The definition of unemployment according to the Census Dictionary is as follows:

The unemployed include those persons who, during the week prior to enumeration:

1. were without work, had actively looked for work in the past four weeks and were available for work; or
2. had been on lay-off for 26 weeks or less and expected to return to their job; or
3. had definite arrangements to start a new job in four weeks or less (Supply and Services Canada, 1982, p. 28).

Thus, the proportion of residents between 15 and 64 years of age in the labour force is a measure of participation in the wage economy. On the other hand, the unemployment variable is a ratio of people who are unemployed to the number of people in the labour force. Therefore, it is possible that a census division may have very low unemployment but have relatively few of its residents in the actual labour force.

The migration and length of residency variables are two measures of mobility for a population. The migration variable applies to long distance movers and includes movers who, on Census Day, were residing in a different census subdivision within Canada or were living outside of Canada five years earlier (Supply and Services Canada, 1982, p. 34). The relationship between a developing population's mobility and its level of development, especially the economic component, has been well documented. Clark (1982, p. 9) suggests that the reason for approximately half of the moves of greater than fifty miles relates to improvements in employment or economic conditions. The importance of improved chances for employment as a reason for migrating increases as the distance of the move increases. If unemployment and potential improvements in economic conditions are a stimulus to out-migration, then locations with a large number of recent immigrants should have relatively better socio-economic conditions. This idea is further supported by the notion that long-distance moves tend to generate significant increases in income (Grant and Vanderkamp, 1980, p. 399).

Also, a recent article on migration in Canada suggests that the rate of

migration is, in general, directly proportional to socio-economic status (Trovato and Halli, 1983, p. 245). This statement results from the notion that persons in more advantaged social positions have a greater degree of awareness of social and economic opportunities at places other than the origin.

The three income related variables serve quite different functions. First, similar to the labour force variable, the population over 15 year of age are divided into those with income and those without. The variable, percent of residents with no income, gives an indication of the economic dependency ratio of the population. The average income variable is also an important indicator of the economic conditions of residents in a census division. However, an issue central to many debates on the role of higher income on improved developmental conditions is income distribution. Many development theorists would argue that a degree of inequality is a normal and expected part of the development process. Williamson (1965) presented empirical evidence to suggest that income inequalities often increased in the initial stages of the development process and then would subside in later stages. However, Williamson's arguments applied to a developing nation or region and not to relatively underdeveloped people living within a highly developed nation. If a large proportion of natives living in some region in Canada have extremely low levels of income, then they are likely to have lower living conditions. Such conditions manifests themselves in lower education, nutrition and health levels which lead to low economic productivity and lower overall levels of development. The income distribution variable in this analysis, the percentage of residents with an annual income of less than \$2,000, is an attempt to measure the proportion of residents in a given region living in poverty conditions.

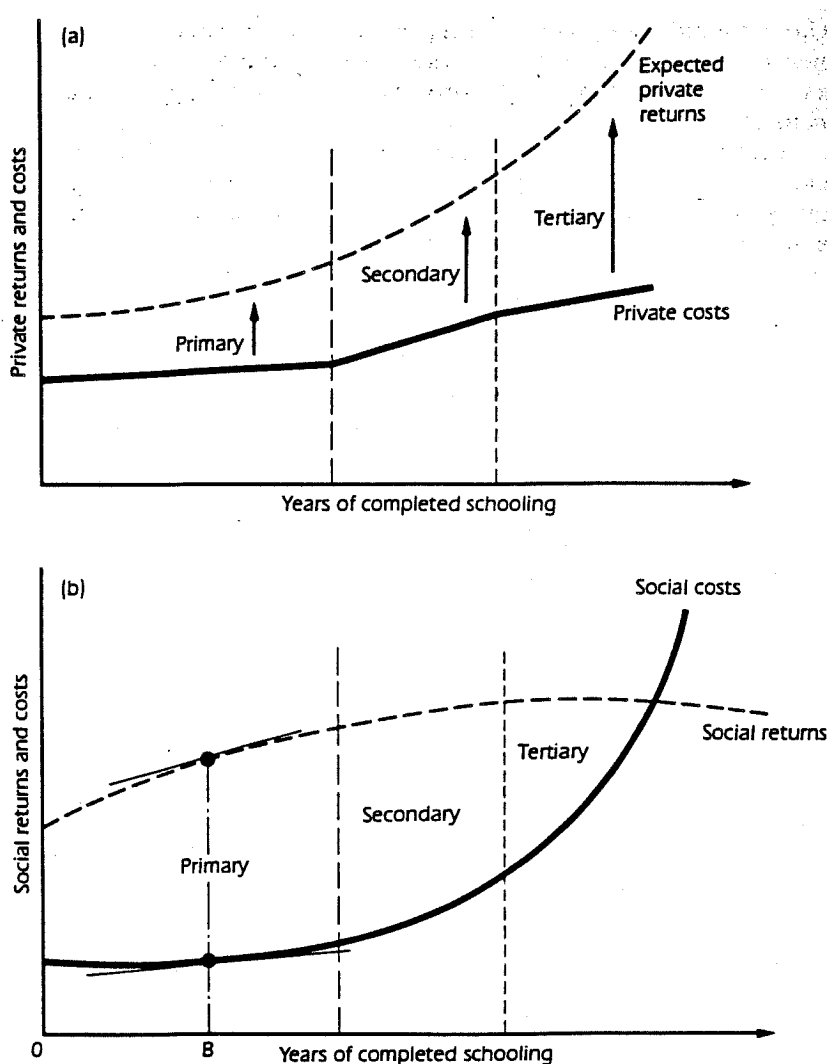
The education variable is critical to an analysis of the overall level of development. The relationship between improved education levels and increased development has long been the basis of development strategies in Third World nations as well for underdeveloped peoples within a developed nation. Todaro reveals that education has become a much higher priority in almost every nation in the past few decades and although enrollment levels still tend to be higher in developed than in underdeveloped nations, the gap is closing (Todaro, 1981, p.

293).

As noted above, the education variable selected for this analysis is the percentage of residents over the age of 15 who have less than a Grade 8 education. This level of education is generally considered the line of literacy and having all residents with at least this minimum level of education is considered by the author to be critical to the overall development of the population.

Todaro states that there is a fundamental difference between the private and social benefits and costs to increased education. Todaro's model of the private versus social costs and benefits of increasing education is provided in Figure 2.

Figure 2



The top diagram reveals that while the costs to an individual to gain more education increases as the number of years of schooling increases, the expected personal return from the higher education increases at a much more rapid rate. The result is that from an individual's point of view the more education they can receive the better. The social costs and benefits of increased education, however, are much different. The social costs of education, which is the opportunity cost to a society as a whole of financing costly educational expansion at higher levels when these funds may be used in other sectors of the economy, increases rapidly as a student increases the number of years of their education (Todaro, 1981, p. 305). The increased social costs of post-secondary education relates to the higher per student cost in terms of buildings, equipment, etc. The more rapid increase in the initial stage of the social return curve relates to the improved productivity which would result from a *basic education* and the attainment on literacy, numeracy and elementary vocational skills (Todaro, 1981, p. 307). The notion which Todaro is suggesting is that society receives a higher marginal benefit from having all members of society with a basic level of education than it would from having all members with a post-secondary education. This second diagram justifies the choice of the education variable in this thesis from the societal point of view because the provision of a level of education of *B* for all members of the society is the optimal national strategy.

Age structure is a critical issue in development in terms of economic dependency. Even if similar levels of economic performance are found in two regions, if one has a much higher dependency level it would be surprising if the regions had similar overall socio-economic conditions. For example, in Pakistan the percentage of residents in the under 15 years of age category approaches 50% while in Sweden this group comprises only 21% of the total population. The higher dependency rates put increased pressure on the economically active portion of the population and lead to difficulties in achieving overall higher levels of development. Due to the classification scheme used by Census Canada for the 1981 Native Summary Tape, the age distribution variable is the proportion of residents under the age of twenty as opposed to the more standard fifteen.

The variable on the percentage of households who speak either English or French at home is the only variable which is specifically for the study of native development in Canada. The home language is defined as the specific language spoken at home by the respondent at the time of the census and if more than one language is spoken, the language most often spoken was to be reported (Census Dictionary, 1982, p. 16). This is the best available census variable to measure fluency in English or French of native people. This variable is considered important for the reason that economic and social participation of native people in the larger, dominant non-native society often requires an ability to speak the language of the non-native society. This need to speak the language of the local non-native society is demonstrated by the fact that natives outnumber non-natives in only six out of the 140 census divisions in this analysis and on average there are over 130,000 more non-natives than natives in the 140 census divisions. Both English and French are used because of the importance of the French language in many areas of Canada particularly in the province of Quebec.

One of the more *social* variables used in this analysis is the family structure variable, percentage of families which are lone parent families. The family structure variable used by Smith in his 1977 research was husband and wife households per 1000 households which had a correlation of -0.43 with average income (Smith, 1977, p. 272). This suggests that as the proportion of husband and wife households increases, the average income decreases. Smith's variable is essentially opposite to the percentage lone parent families variable used in this analysis. However, it is not apparent in Smith's work whether the total number of households included single people or just families. If the total number of households included single people, then the correlation between the number of husband and wife households and average income in Smith's study would be less surprising.

A family in Canada is defined by the Census Dictionary as a husband and wife (with or without children who have never married), or a lone parent of any marital status, with one or more children who have never married, living in the same dwelling (Census Dictionary, 1982, p. 59). Under this Canadian definition, it

is clear that the family structure variable does not include singles.

Variables relating to housing quality are often included in development indicators especially those which are most concerned with overall socio-economic conditions and well-being. Smith included three housing variables under the general heading of environment, suggesting that housing is an important source of not only shelter and comfort but status (Smith, 1977, p. 269). Smith was very concerned about well-being and suggested that housing was an important component of well-being. The two housing variables included in this analysis are: (1) the percentage of houses in a census division requiring major repairs, and (2) the percentage of houses in a census division with a central heating system. Central heating systems are often found in modern homes. Traditional heating systems such as wood stoves, fireplaces and space heaters are often found in older homes; thus this variable should reflect the quality of housing in a census division. The variable relating to the percentage of households requiring major repairs was, unfortunately, up to the individual respondent's perceptions. This means that a consistent definition was not in use across Canada. However, this variable still is of use as an individual's perception is the best available variable to reflect housing quality.

All fifteen variables used in this analysis are in percentages, rates and averages to avoid the effect that the varying size of the native population in census divisions could have on the analysis.

3.4 Method of Analysis

The primary method proposed for the computation of a development measure is principal components analysis. Principal components can be used for three general purposes: (1) to identify groups of inter-correlated variables, (2) to reduce the number of variables being studied, and (3) to rewrite the data set in an alternate form (Johnston, 1980, p. 128). Each of these purposes are, in part, required in this analysis. The identification of groups of interrelated variables can provide useful insights into the development process as a whole. Although this is

not the primary objective of this paper, the grouping of the variables in this analysis certainly indicates the complexity and multidimensionality of the development process. The third purpose of principal components is the primary one used in this analysis.

The reduction from variables to components is important to the indicator approach to measuring development. The reduction in the number of variables means that any variables which may have been measuring the same thing are eliminated. Thus if the length of residency and unemployment levels are strongly correlated and load on the same factor, regardless of the nature or cause of the relationship between the variables, their effect is counted as one, i.e., the component score. Also, the components created are rotated orthogonally to each other resulting in statistically independent components. This means that if two variables are similarly contributing to the overall level of development, their effect should not be double counted because of the orthogonal rotation.

Once the principal components analysis is completed, component scores may be computed by:

$$S_{ik} = \sum_{j=1}^n D_{ij} L_{jk}$$

where: D_{ij} is the standardized value for census division i on variable j ;

L_{jk} is the component loading of variable j on component k ;

S_{ik} is the component score of census division i on component k ; and the summation is over all n variables.

The overall level of development can then be computed by:

$$O_k = \sum_{i=1}^m S_{ik}$$

where: S_{ik} is the component score of census division i on component k ;

O_k is the overall level of development for census division i ; and the summation is over all m components.

The reduction of variables to components and statistically independent components are two major advantages of this method of computation of a development indicator. In previous studies, such as Morris (1979) and McGranahan (1972), variables were rescaled to a 1 to 100 scale and then combined, and in the case of the McGranahan study weighted by the average correlation with the other variables. In the case of Morris, the three rescaled variables are simply averaged for the PQLI regardless of the potentially interdependent nature of the three indicators which were chosen. As noted above, the principal component technique eliminates the double counting of the similar effects of two variables by first, providing one component score to represent variables loading on that component and secondly, by orthogonally rotating the components to result in statistically independent components.

The problem of weighting of variables in an overall measure of development is one which has long plagued the indicator approach. In Morris' study the problem of weighting is ignored as the three indicators are assumed to represent different aspects of the quality of life and are assumed to contribute equally to the overall quality of life as they are simply averaged. McGranahan attempts to address the problem by weighting each variable by the average correlation of that variable with all other variables. He felt that this would reflect the importance of that variable relative to all the other variables. In other words, the variable with the highest average correlation would be given a stronger role in the overall measure than a variable poorly correlated with the other variables. This method has some merit, however the original rescaling by correspondence analysis and the weighting using different correlations for nations at different, preconceived levels of development makes the overall measure somewhat suspect.

As noted above, principal components analysis weights the variables on each

component by multiplying the factor loading of that variable by the standardized value of the variable. This results in variables contributing differently to the overall component score based on the factor loading and the use of the single component score, rather than all the variables loaded upon it, eliminates the double counting of the similar effect of two variables. Orthogonally rotating the components provides statistically independent components. The fact that these components are completely unrelated justifies the equal combination of the components into one overall measure of development without concern for, again, doubling counting the influence of one factor of development.

Principal components analysis, rather than other factoring methods, is used because it computes exact component scores. Other factoring methods such as principal axis factoring or minimum residual method (Minres) provide estimates for factor scores (Kass and Tinsley, 1979, p. 136). Since the component scores are pivotal in this analysis exact computations rather than estimates are required.

Finally, the use of principal components analysis allows the influence of a variety of variables to be included into an overall measure of development without the double counting of the influence of any factor of development. This method provides a good statistical solution to the problem of weighting in an overall measure of development. However, the solution is a statistical one and not one with any basis in development theory. The major drawback to computing one overall measure of development is that not enough is known about the contribution of the various aspects of development to the overall well-being of the population. Until such time as these theoretical deficiencies are rectified, statistical solutions to the problem of weighting will have to be sufficient.

4. SPATIAL VARIATIONS IN THE LEVEL OF NATIVE DEVELOPMENT

In this chapter, development indicators are utilized to examine the spatial variations in the level of development of natives in Canada. There are six major sections to this analysis. The first involves the examination of descriptive statistics related to each of the fifteen variables discussed in the previous chapter. The second section examines the correlation matrix from which the principal components analysis will be conducted. The principal components analysis is the focus of the third section. The communalities for each of the variables and variables comprising each component are examined in detail in this section. Provincial variations in native development are examined in section four while the most and least developed census divisions are discussed in section five. The final section of this chapter involves a discussion of the overall patterns of native development in Canada.

4.1 Descriptive Statistics

One of the first and most important steps in any multivariate statistical analysis is an examination of descriptive statistics on the variables used in the analysis. This allows the researcher to gain a better understanding of the variables being used and gives an initial evaluation of the possible usefulness of certain variables. For example, when the researcher is examining variables for spatial variation, a simple mean and standard deviation can provide valuable evidence to the degree of spatial variations.

The mean, standard deviation, minimum and maximum values for each of the fifteen variables for the 140 census divisions are presented in Table 5. There is considerable variation in the means and standard deviations of the variables. For example, the variable on the percentage of households with greater than seven persons per bathroom has a relatively low mean and standard deviation with both values being approximately 7.5. At the other end of the continuum the variable percentage of native households speaking either English or French at home has a mean of 82% and a rather large standard deviation of 23.0. Overall, the means and standard deviations of each variable seem to indicate a reasonably wide range

Table 5 Descriptive Statistics on Fifteen Original Variables

Variable	Mean	Standard Deviation	Minimum	Maximum	Number of Cases
% Unemployed	17.57	7.61	0.00	48.98	140
% in Labour Force	51.11	12.30	17.74	79.10	140
% who are Migrants	23.53	11.24	0.59	59.34	140
% Lone Parent Families	20.29	5.64	8.57	38.46	140
% with No Income	23.89	6.48	8.89	47.54	140
% with < Grade 8	34.86	15.14	8.15	74.62	140
Average Income (\$)	8383.69	1907.52	4139.00	13268.00	140
% of Pop. < 20 Years Old	50.78	7.14	29.06	62.87	140
% with > 7 per Bathroom	7.45	7.34	0.00	41.38	140
% of Houses Needing Major Repairs	17.83	7.65	4.07	42.70	140
% of Houses Speaking English or French at Home	81.96	22.98	3.80	100.00	140
% of Houses with Central Heating	71.57	17.59	17.24	97.96	140
% with < \$2000 Income	22.16	7.02	2.20	51.52	140
% who have Resided > 5 Yrs.	35.06	11.60	10.68	65.52	140
# of Births per 1000 Pop.	25.01	6.06	8.33	41.14	140

of values.

The minimum and maximum values of each of the variables also indicates a wide variation in conditions for native people across Canada. The unemployment variable indicates that at the time of the 1981 census there was 0% unemployment among natives in Census Division No. 10 in Alberta which covers the oil rich area between Edmonton and Lloydminster. At the same time, there was nearly 50% unemployment for natives residing in the Quebec census division of Pontiac which lies northeast of Hull on the Ontario/Quebec border. A similar range of conditions exists for the education variable. In Halton Regional County in southern Ontario, only 8.2% of the natives have less than a Grade 8 education. This compares with the Baffin and Central Arctic census divisions in the Northwest Territories where over 70% of the native people have less than a Grade 8 education. Finally, the average income variable also indicates the wide range of conditions with an average income of \$4,139 for natives in Victoria County in New Brunswick while native people in the Laprairie census division in Montreal have an average income of \$13,268.

4.2 The Correlation Matrix

The correlation matrix of the fifteen original variables is the basis of the principal components analysis. This matrix also reveals some interesting relationships between certain pairs of variables as the correlation coefficient indicates the strength and direction of the relationship between the variables. A coefficient of 1.00 indicates a perfectly positive relationship, i.e., as one variable increases or decreases, the other variable increases or decreases at an equal rate. A coefficient of -1.00 indicates a perfectly negative relationship between two variables where as one variable increases the other variable decreases at an equal rate or vice versa. A correlation coefficient of zero indicates that there is no relationship between two variables.

Three sets of relationships indicating the highly interdependent nature of the development process are: (1) education and labour force participation, (2) the birth

Table 6 Correlation Matrix for Fifteen Original Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
% Unemployed	1.000														
%in Labour Force	-.418	1.000													
% who are Migrants	-.347	.591	1.000												
% Lone Parent Families	-.078	.545	.302	1.000											
% with No Income	.374	-.755	-.539	-.386	1.000										
% with < Grade 8	.245	-.720	-.565	-.492	.502	1.000									
Average Income	-.426	.741	.468	.351	-.450	-.608	1.000								
% of Pop. < 20 Years Old	.107	-.566	-.186	-.358	.415	.505	-.548	1.000							
% with > 7 per Bathroom	.252	-.539	-.534	-.432	.402	.629	-.456	.466	1.000						
% Needing Major Repairs	.262	-.591	-.483	-.348	.414	.419	-.553	.421	.475	1.000					
% Speaking Eng./French	-.146	.581	.501	.431	-.445	-.652	.400	-.401	-.716	-.373	1.000				
% with Central Heating	-.192	.545	.511	.303	-.429	-.601	.449	-.411	-.379	-.550	.361	1.000			
% with < \$2000 Income	.293	-.506	-.265	-.174	.310	.384	-.676	.565	.367	.502	-.248	-.266	1.000		
% Resident > 5 Yrs.	.389	-.474	-.678	-.086	.423	.306	-.353	-.022	.334	.401	-.298	-.480	.133	1.000	
# of Births per 1000 Pop.	.064	-.478	-.038	-.326	.292	.410	-.505	.748	.308	.434	-.305	-.331	.493	-.124	1.000

rate and income distribution, and (3) fluency in English or French and education. These three are noted although examination of the correlation matrix reveals several interesting relationships.

The correlation coefficient between the percentage of native people over 15 years of age with less than a Grade 8 education and the percentage of natives between 15 and 64 years of age who are in the labour force is -0.72. This relationship indicates that as the proportion of native people in census divisions in Canada with low education levels is reduced, the proportion involved in the labour force increases. This coefficient supports the notion that improved education levels lead to increased involvement in the labour force.

The relationship between the birth rate in each census division and the percentage of native people over 15 years of age with less than \$2000 annual income is 0.49. The positive correlation coefficient indicates that as the birth rate declines, the proportion of people in the extremely low income category also tends to decline. This tie between the birth rate and the economic well being of the native population of a census division is in support of the Demographic Transition Theory.

The third relationship, between the percentage of households speaking English or French in their home and the percentage of residents with less than Grade 8 is -0.65. This reveals that as the proportion of households speaking either English or French increases, generally the education level of the native population also increases. This finding reflects the fact that many native students attend predominantly non-native speaking schools and fluency in either English or French greatly enhances a student's chances of attaining higher education levels.

As a final note to the correlation matrix, Smith (1977) noted a negative correlation of -0.43 between the number of husband wife families per 1000 total and average income in the United States. In this analysis, an opposite variable, the proportion of lone parent families, is used. Table 6 indicates that similar results apply to native families in Canada. The correlation between the proportion of lone

parent families and average income is 0.35. Thus, the higher the number of lone parent families in a census division, the higher the average income. Another interesting relationship is lone parent families and education levels. The correlation between the percentage lone parent families and the percentage with less than Grade 8 education is - 0.49. The implication is that the higher the number of lone parent native families in a census division, the higher the education level. These two correlations, I believe, are a reflection of lone parent variable. The persons most likely to be in a lone parent family are young women. Education and thus their ability to work in the modern economy is much higher among young native Canadians than the older native residents. Education has become a priority among natives and governments in recent years which is resulting in the higher education levels among young adults. Also, since the social acceptability of lone parent families has also increased in recent years, it is not surprising to see a positive relationship between the proportion of lone parent families and higher education and income levels.

4.3 Principal Components Analysis

The results of the principal components analysis are presented in four sections. The first section examines the tests required prior to the analysis in order to check the validity of completing principal components analysis on a particular set of data. The overall results are presented in the second section including the variance in the original data matrix which is accounted for by the analysis. The variables comprising each of the components resulting from the analysis are discussed in the third section while the final section examines the question of the sign of the component.

4.3.1 Tests Prior to Principal Components Analysis

The Kaiser-Meyer-Olkin measure of sampling adequacy is an index for comparing the magnitudes of the correlation coefficients to the magnitudes of the partial correlation coefficients (Norusis, 1985, p. 129). The equation is in the form:

$$\text{KMO} = \frac{\sum \sum r_{ij}^2}{\sum \sum r_{ij}^2 + \sum \sum a_{ij}^2}$$

where:

r_{ij}^2 is the squared correlation coefficient
between variables i and j ; and

a_{ij}^2 is the squared partial correlation
coefficient between variables i and j .

If the squared partial correlation coefficients are small relative to the squared correlation coefficients, principal components analysis is not advisable. The importance of this is that a small partial correlation coefficient would suggest a relatively unique relationship between the two variables with other variables in the analysis being somewhat unrelated. Since the purpose of principal components analysis is to examine for patterned variation among the variables a situation where pairs of variables are related but the variation cannot be accounted for by other variables is undesirable. The KMO measure takes a maximum value of 1 and Kaiser suggests that a value higher than 0.60 is acceptable (Kaiser, 1974, p. 34). The KMO measure for this analysis is 0.860 which is well above the critical level suggested by Kaiser.

Another method to test whether a correlation matrix is valid for principal components is Bartlett's Test of Sphericity. This tests the hypothesis that the correlation matrix is an identity matrix, in other words, has values of 1.00 along the diagonal and 0.00 on the off-diagonal (Norusis, 1985, p. 128). This test may be viewed as an overall test as to whether the correlations making up the matrix are significantly different from zero. The Bartlett measure for this analysis was 1362.24 which is significant at less than the 0.0001 level. Clearly, this correlation matrix is not an identity matrix and it appears as if principal components is completely valid on this correlation matrix.

4.3.2 The Overall Results of the Analysis

The principal components analysis results in three components accounting for 67.6% of the variation in the original fifteen variables. The criterion for retaining components is the standard acceptance of all components with an eigenvalue greater than one. The sum of the squared factor loadings of each variable on a component is its eigenvalue (Johnston, 1980, p. 138).

Communalities are the proportion of variation in each variable which is accounted for by the significant components (Davies, 1984, p. 41). This is a measure of how well each individual variable is represented by the three components in the analysis. The communalities for the fifteen variables in the analysis are presented in Table 7. The lowest communality is for the variable percentage of households with central heating for which only 48% of the variation is being accounted for. The highest value is for the percentage of residents in the labour force where 82% of the variations are accounted for by the three components.

4.3.3 Variables Comprising the Three Components

As noted above, three components resulted from the analysis and, although not the primary purpose of this research, the factor structure may provide some interesting insights into the interrelationships among the variables. The three components and the variables associated with each are provided in Table 8. The factor loadings are also provided in this table and may be interpreted as the correlation between each variable and the component to which it is related (Johnston, 1980, p. 138). Traditionally, names are provided for each component relating to the underlying process resulting in a group of variables loading on the same component. However, this labelling is a completely subjective activity which can often be misleading. Although names have been provided for the three components in Table 8, the author suggests that when the components are discussed further in the text the reader should refer back to this table for the list of the specific variables loading on each component. The reason for this approach

Table 7 Communalities of the Fifteen Original Variables

Variable	Communality
% Unemployed	.558
% in Labour Force	.820
% who are Migrants	.768
% Lone Parent Families	.535
% with No Income	.535
% with < Grade 8	.728
Average Income	.757
% of Pop. < 20 Years Old	.785
% with > 7 per Bathroom	.635
% Needing Major Repairs	.546
% Speaking English or French	.710
% with Central Heating	.479
% with < \$2000 Income	.713
% who have Resided > 5 Yrs.	.789
# of Births per 1000 Pop.	.789

is that specific variables may not be well reflected in the label provided by the researcher. Also in some particular census division, one variable may be of paramount importance in the component score.

Each of three components are now examined in more detail. Component I has six variables which loaded most strongly upon it and has been named the *modernization* component. The strongest loading variable on this component is the variable percentage of households where English or French is spoken which has a

Table 8 Components and Factor Loadings

Components	Factor Loadings
Modernization	
% Speaking English or French	.818
% with < Grade 8	-.733
% with > 7 per Bathroom	-.724
% Lone Parent Families	.702
% in Labour Force	.570
% with Central Heating	.470
Economic/Demographic	
# of Births per 1000 Pop.	.827
% with < \$2000 Income	.791
% of Pop. < 20 Years Old	.787
Average Income	-.675
% Houses Needing Major Repairs	.481
Mobility/Participation	
% who have Resided > 5 Yrs.	.842
% who are Migrants	-.703
% Unemployed	.703
% with No Income	.494

factor loading of 0.82. Other variable loading positively on this component include the percentage of lone parent families, the percentage of residents in the labour force and the percentage of households with a central heating system. The variables which loaded negatively on the component were the percentage of residents with low education levels and the housing pressure variable, percentage of households with greater than seven persons per bathroom. Fluency in English or French, participation in the wage economy and the presence of a central heating system versus low education levels and high housing pressure led to this component being called a *modernization* component.

Component II has five variables loaded upon it and has been named the *economic/demographic* component. This component has a clear combination of

economic and demographic variables. All but one of the variables loaded positively on this component. The number of births per 1000 population has a factor loading of 0.83 which is the strongest for this component. The income distribution, age distribution and housing quality variables also loaded positively on this component. The average income for the census division was the only variable loading negatively on its component with a value of -0.68.

There are four variables loaded on Component III which has been named the *mobility/participation* component. The percentage of residents having resided in the census division for greater than five years had the strongest loading at 0.84. Other variables which loaded positively on this component are the unemployment variable (0.70) and the percentage of residents without any income (0.49). The percentage of residents which have migrated between census sub-divisions was the only variable to load negatively with a value of -0.70.

4.3.4 The Sign of the Component

As was noted in the methodological section, the factor scores associated with each of the components are combined for an overall measure of development for each census division. However, before this can take place the signs of the factor loading for each variable on each component must be examined to ensure consistency when combining the components. For example, the first component has percentage in the labour force and percentage with central heating loaded positively on it and both are assumed to be positive developmental characteristics. The same component has low education and high housing pressure loaded negatively which are generally accepted as poor developmental characteristics. For Component I high overall factor scores indicate good developmental conditions while low negative factor scores indicate poor developmental conditions.

Component II has variables, such as the birth rate and percentage with less than \$2,000 income, loading positively on the component while average income is loaded negatively. Since it is generally accepted that high average incomes, low birth rates and a small proportion in low income categories are desirable

development characteristics, the sign of the factor scores need to be reversed for this component. This is necessary to maintain consistency with Component I where higher factor scores were related to better developmental conditions.

In Component III, the percentage of residents unemployed and the percentage without any income both are loaded positively, indicating the need for the signs of the factor scores associated with this component to be reversed. Again, this is required to ensure that the higher factor scores are related to the better developmental conditions.

4.4 Provincial Variations in Native Development

Combining the factor scores provides an overall measure of development for the natives residing in each census division in Canada. This overall measure of development is provided, along with the score for each component for each census division in Appendix A. The development measure for individual census divisions are examined in the next section while in this section upward aggregations to provincial averages are discussed. The provincial averages for each of the components and the overall measure of development are provided in Table 9. These provincial averages indicate the general pattern of native development in Canada while the analysis of the development measure by census division reveals a much more detailed pattern.

The province with the most developed natives is Ontario with an average development measure of 0.94. Ontario natives have positive values for all three components and also have the highest average for the *modernization* component. Alberta natives rank as the second most developed with an overall measure of 0.53. Alberta natives rank first on the *mobility/participation* component which relates to the low unemployment levels found in Alberta in 1981. The average values for the other two components are both negative for Alberta natives. The third highest development measure belongs to natives in British Columbia with a score of 0.45. Natives in British Columbia are the only ones besides Ontario to have positive averages on all three components. The final province with a positive average

**Table 9 Provincial Averages for the Three Factors
and Overall Level of Development**

	Modernization	Demographic & Economic	Mobility & Participation	Overall Development
Ontario	0.55	0.33	0.07	0.94
Alberta	- 0.49	- 0.17	1.21	0.53
British Columbia	0.36	0.01	0.07	0.45
Quebec	- 0.28	1.20	- 0.78	0.15
Yukon / N.W.T.	- 1.51	- 0.07	0.55	- 1.03
Manitoba	- 0.22	- 0.80	- 0.04	- 1.06
Atlantic Region	0.15	- 0.60	- 0.74	- 1.19
Saskatchewan	- 0.49	- 1.02	0.13	- 1.39

development measure for its natives is Quebec. The overall average development measure for Quebec natives is 0.15 and interestingly Quebec's natives have the highest value for the *economic/demographic* component while having the lowest value for the *mobility/participation* component.

On the negative side of the continuum, the fifth highest development measure is -1.03 for the natives in the Yukon and Northwest Territories. It is a somewhat surprising result to see the natives in northern Canada having this high of an overall development measure. However, even with the relatively high overall measure, natives in the Yukon and Northwest Territories have the lowest measure (-1.51) for the *modernization* component. Natives in Manitoba are the sixth most developed with an overall average of -1.06. Interestingly, Manitoba is the only province where there is a negative average value for each of the three components.

Since only nine census divisions from the Atlantic region are applicable for

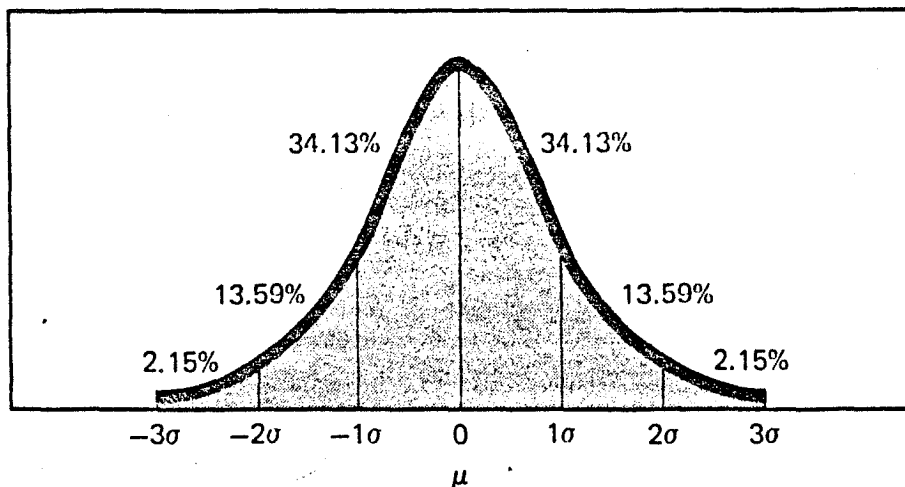
this analysis, they have been combined into a single aggregate measure for this section. The natives in the Atlantic region have the seventh highest development measure at -1.19. The province with the least developed natives is Saskatchewan with the lowest overall average development measure of -1.39. Saskatchewan natives have the lowest average value on the *economic/demographic* component and second lowest average on the *modernization* component.

4.5 The Pattern of Native Development in Canada

To examine the spatial variation in the level of development of natives in Canada the pattern of development is mapped. In order to map this pattern, a classification scheme is required for the overall measure of development for the census divisions in Canada.

The overall measure of development which has been created for native people in Canada approximates a normal distribution. The average development measure for natives in the 140 census divisions is zero. This is extremely useful as each census division's development measure may be examined and is easily interpreted as being either above or below average. This is also a convenient place to begin a classification scheme. If a distribution of values is normal then the situation displayed in Figure 3 exists.

Figure 3



This scheme allows for a rational classification system. The areas within one standard deviation of the mean creates two classes of census divisions which are either slightly above or slightly below the average development measure. Two other classes are created by those census divisions which lie at the extremes of the distribution with either extremely developed or underdeveloped native people. As indicated in Figure 3, approximately one-third of the census divisions should fall into each of the two classes around the mean and approximately 16% in each of the extreme classes. This classification scheme should reveal where a large proportion of the native people with either above or below average development measure reside as well as indicating where the extremely or poorly developed native people reside.

The standard deviation of the development measure created for natives in the 140 census divisions is 1.73. As noted above, the mean value for the development measure is zero and the distribution of values approximates normality. A reflection of this approximation is revealed in Table 10 which contains the number of census divisions falling into each class and the percentage of the total census divisions each class contains. It should be noted how closely these percentages reflect those presented in Figure 3 for the normal distribution.

Table 10 Classification of Native Development in Canada

Class		Frequency	Percent
Extremely Poor Development	- ∞ to -1.74	24	17.1
Below Average Development	-1.73 to -0.01	44	31.4
Above Average Development	0.00 to 1.73	49	35.0
Extremely High Development	1.74 to ∞	23	16.4

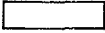

Figure 4, a map of the above classification scheme provides some useful



Spatial Variations in Native Development in the Western Provinces and the Territories

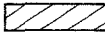
Figure 4(a)



Development

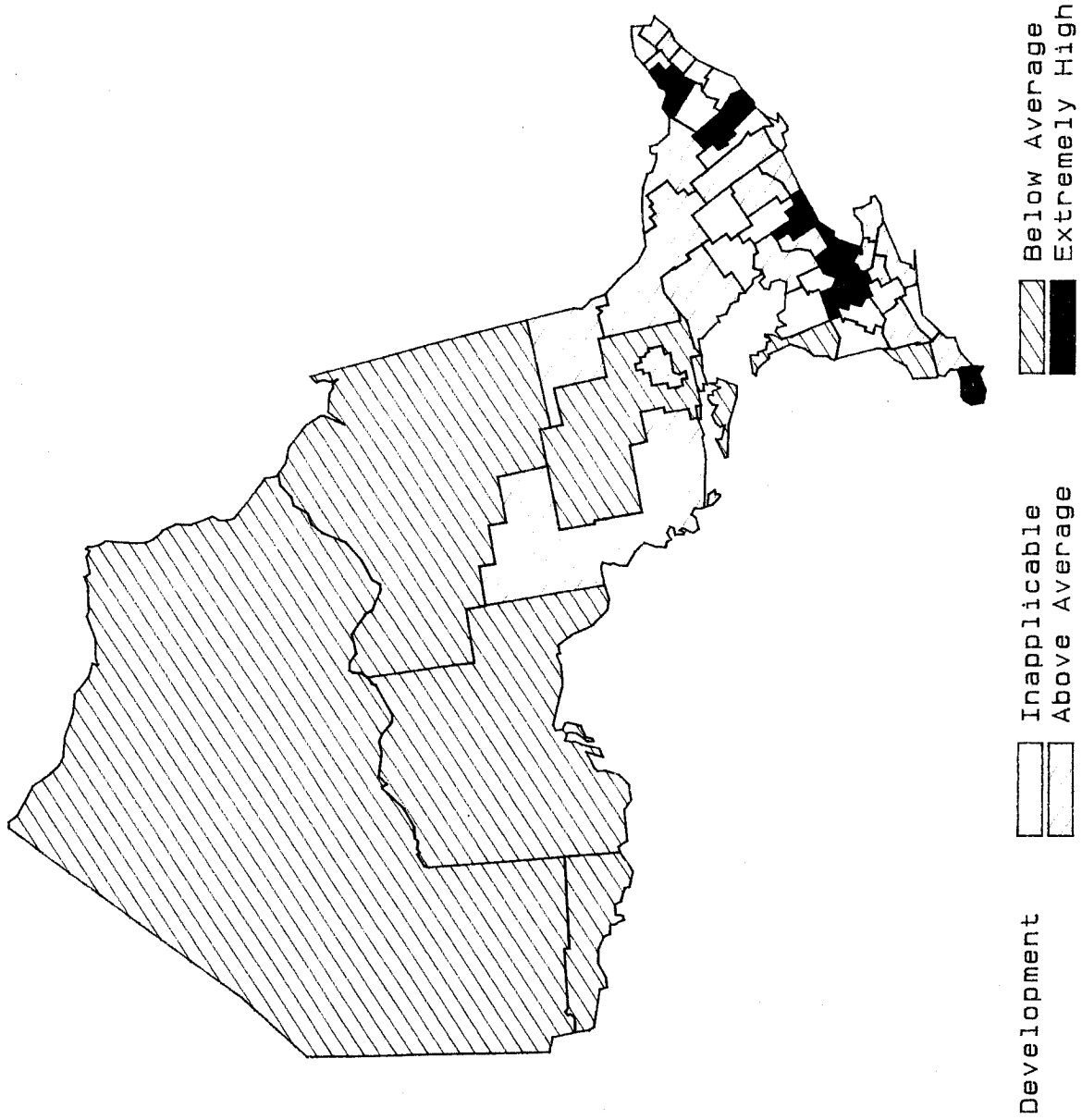
 Inapplicable
 Above Average

 Extremely Poor
 Extremely High

 Below Average

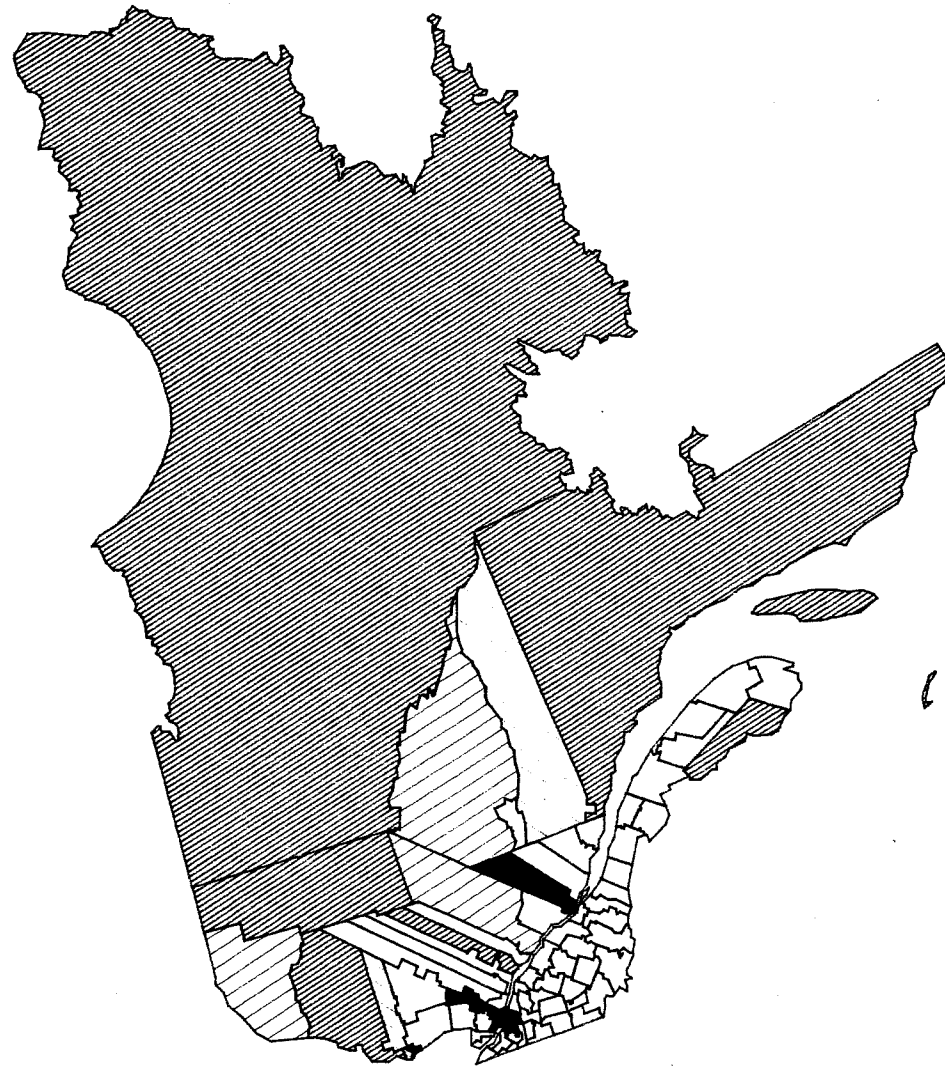
Spatial Variations in Native Development in Ontario

Figure 4(b)



Spatial Variations in Native Development in Quebec

Figure 4(c)



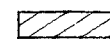
Development



Inapplicable
Above Average



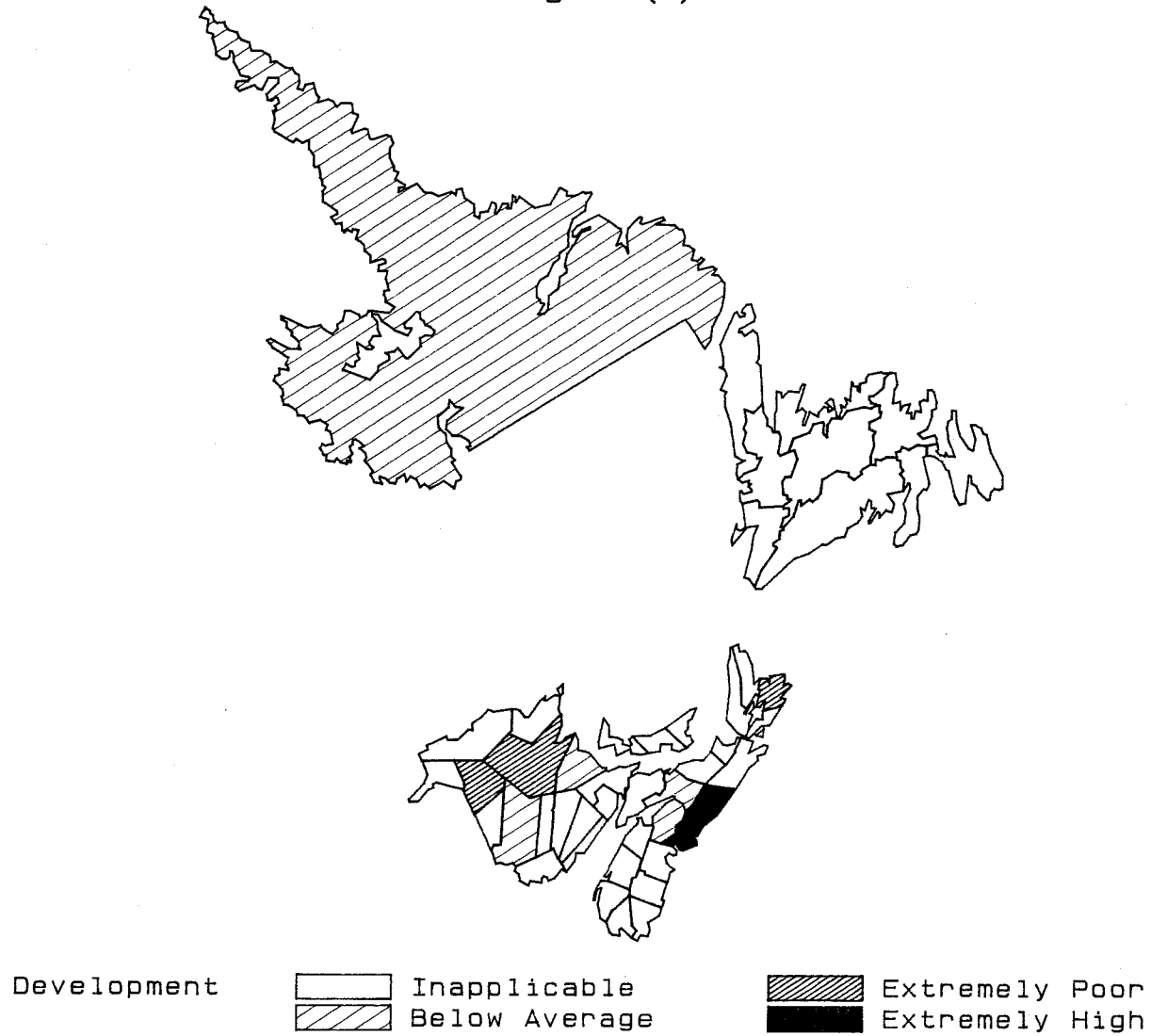
Extremely Poor
Extremely High



Below Average

Spatial Variations in Native Development in the Maritimes

Figure 4(d)



insights into the overall pattern of development for native people in Canada. First, the census divisions where native people with below average development measures reside are examined. To some degree, a north/south split does exist with the natives in the northern parts of most provinces having below average development. This, however, is not the whole story as several census divisions in the extreme southern part of Canada have extremely poor development measures. For example, the next section will examine the most and least developed census divisions and the two least developed census divisions are in southern Quebec, Maskinonge, and central New Brunswick, Victoria County.

Census divisions in the extremely poor development category are concentrated in three provinces. The most extreme concentration is in Manitoba and Saskatchewan where there are over half of the census divisions in the extremely poorly developed category. This concentration does not take on a north/south pattern as the least developed natives in Saskatchewan reside in Division No. 1 which is around the Estevan area in the southeast corner of the province. The least developed natives in Manitoba are in Division No. 8 in the southwest corner of the province and adjacent to the Estevan census division. The other concentration of census divisions in the extremely poorly developed category are in northern and southwest Quebec.

One of the interesting results of this analysis is the development measures for the natives residing in the two northern territories. In the Yukon, natives have a development measure which is above the average for natives in Canada as a whole. In the Northwest Territories, four out of five census divisions fall into the below average development category while only the Baffin Region has a development measure which places it in the extremely poorly developed category. It is probable that most Canadians would expect that natives in northern Canada would be among the least developed in the country and this result is clearly a tribute to the rapid provision of infrastructure which has taken place in the northern territories in the past few decades.

A clear pattern is revealed when examining the location of the twenty-three

census divisions comprising the highly developed category. The most highly developed natives in Canada reside in the areas of highest population concentrations. Most of the larger urban centers in Canada contain natives which fall in the most highly developed category. This list of cities which fall into the most highly developed category include: Halifax, Quebec City, several census divisions in the Montreal region, Ottawa, Toronto and six other census divisions in southern Ontario, Edmonton, Calgary, Vancouver and Victoria. Even the Saskatoon and Winnipeg census divisions have above average development measures while many of the census divisions around them are in the extremely poorly developed category. As well, the above average census divisions are concentrated around these large population centers especially in southern Ontario, southern Alberta and southern British Columbia.

4.6 The Most and Least Developed Census Divisions

A reflection of the overall spatial pattern of native development in Canada is revealed in the ten most and least developed census divisions in Canada. Among the ten most developed census divisions in Canada five are in Ontario and five are in Quebec. The most developed natives at the census division level reside in the Peel Regional Municipality in southern Ontario. This census division contains the city of Brampton and has a development measure of 3.51. The second and third most developed census divisions each had a measure of 3.33 and are the Ottawa-Carleton Regional Municipality and the Chambly census division in Montreal.

Among the ten least developed natives at the census division level three are in Quebec, three in Manitoba, two in Saskatchewan, one in New Brunswick and one in Nova Scotia. The least developed natives live in the Maskinonge census division in Quebec. The natives in this census division in southern Quebec just west of Shawinigan and Trois Rivieres have a development measure of -4.78. Quebec natives provide the most varied conditions within one province. Natives in five Quebec census divisions are among the ten most developed while natives in three other Quebec census divisions are among the ten least developed. The second least developed natives reside in Victoria County which is in southern New

Brunswick.

Table 11 The Ten Most and Least Developed Census Divisions

Most Developed		Least Developed	
1. Peel Regional Municipality (Ont.)	3.51	1. Maskinonge (Que.)	-4.78
2. Ottawa-Carleton Reg. Munic. (Ont.)	3.33	2. Victoria County (N.B.)	-4.34
3. Chambly (Que.)	3.33	3. Division No. 8 (Man.)	-3.07
4. Ile-Jesus (Que.)	3.26	4. Division No. 20 (Man.)	-2.95
5. Halton Regional Munic. (Ont.)	3.21	5. Division No. 19 (Man.)	-2.93
6. Durham Regional Munic. (Ont.)	3.12	6. Division No. 1 (Sask.)	-2.89
7. Waterloo Regional Munic. (Ont.)	3.01	7. Saguenay (Que.)	-2.84
8. Laprairie (Que.)	2.99	8. Cape Breton Cnty. (N.S)	-2.61
9. Ile-de-Montreal (Que.)	2.89	9. Division No. 14 (Sask.)	-2.54
10. Hull (Que.)	2.86	10. Abitibi (Que.)	-2.48

5. DEVELOPMENT INDICATORS AND THE CONCEPT OF DUALISM

5.1 The Concept of Dualism

Dualism is based on the notion of two distinct economic systems coexisting in the same country. In the original work by Boeke (1953), dualism was seen as a creation of colonialism where there was the clashing of an imported socio-economic system with an indigenous social system of a fundamentally different style and with its own set of values. The imposed technologically superior economy tended to dominate the original local economy.

In the post-colonial period, Todaro has noted that dualism has not disappeared but continues to exist long after the colonial powers have been forced to retreat. In fact, Todaro feels that in developing countries the market economy is expanding at the expense of the older one. In this process of expansion, Todaro sees differences between rich and poor peoples increasing. Furthermore, he argues that the two economic systems are a permanent feature of the economic landscape, i.e., the coexistence of wealth and poverty is not simply a historical phenomenon that will be rectified in time but is a permanent feature. This assumption, if correct, has powerful implications for native peoples living in Canada.

Todaro's concept of dualism embraces three other key factors which are:

1. different sets of economic conditions of which some are "superior" and others "inferior" can coexist in a given place at the same time;
2. the degrees of economic superiority tend to increase rather than decrease over time; and
3. the interrelations between the two systems are such that the superior system does "little or nothing" to assist the inferior economy and it may even harm the weaker system.

Usher extends the concept of dualism to the natives in Canada, suggesting that natives and non-natives may be viewed as two societies coexisting in the same region especially in the Canadian north (Usher, 1982, p. 418).

5.2 Methodology of Measuring Dualism

There are two methodological considerations when examining the concept of dualism. First, are the variables used in the establishment of an overall measure of development applicable to the examination of dualistic conditions and if not what adjustments are necessary? Secondly, are changes required to the principal components technique necessary to examine dualism? These two considerations are examined in this section.

5.2.1 Changes in the Variables

The fifteen variables used in the previous chapter examined spatial variations in the level of development of native peoples in Canada. In this chapter, development indicators are used to examine the concept of dualism in terms of native and non-native residents of Canada. However, some of the variables used in the analysis of native development are not applicable for an examination of dualism. The four variables of the original fifteen rejected for the analysis of dualism are: (1) the proportion of residents speaking either English or French as their Home Language, (2) the proportion of residents who are migrants, (3) the proportion of residents who have resided in the same household for greater than five years, and (4) the proportion of households with greater than seven persons per bathroom.

The language variable, proportion of households speaking either English or French as their home language, was important in the study of native development but when attempting to examine non-native as well as native development, the role of language is diminished. For example, 96% of non-native households speak either English or French at home which indicates that there is little variation in the variable reducing its usefulness in the study.

In the previous chapter, the importance of mobility to a developing population was discussed. However, the desirability of a highly mobile developed population may be questioned. For example, two scenarios may exist in a developed population. First, a census division with high incomes, stable employment, and a

stable population will have low mobility as well as a high level of development. The second possible situation is where there is expanding employment opportunities, high incomes and a large proportion of recent migrants. In both scenarios, the overall level of development is likely to be high but in the second case there are a large number of migrants whereas in the first case there are few recent migrants. The relationship between development and mobility begins to become clouded in the case of a developed nation. For these reasons, the two variables relating to mobility and migration are removed for the analysis of dualism in Canada.

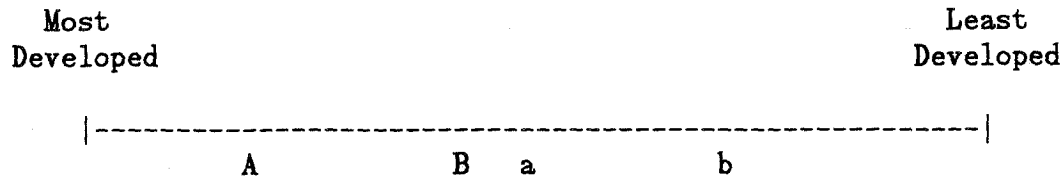
The variable relating to the proportion of households with greater than seven persons per bathroom is removed from the dualism analysis for technical reasons. There are extremely few non-native households in Canada which fall into this category ($< 1.0\%$) resulting in almost no spatial variation in this variable. This results in this variable being removed from the dualism analysis.

5.2.2 Changes in the Principal Components Analysis

In the establishment of the level of development of native people in Canada, principal components analysis was completed on fifteen variables for 140 census divisions in Canada. In order to examine the concept of dualism, it is necessary to compare the developmental conditions of the native and non-native residents in each of the 140 census divisions applicable to this study.

The approach used to compare native and non-native developmental conditions in each census division is to include data on non-native residents in the principal components analysis. The result is a data set that included eleven variables for 280 cases as opposed to the 140 for the establishment of native development levels. A schematic of a possible scenario is provided in Figure 5 and indicates that for each census division two development measures are calculated, one for native residents and one for non-native residents.

Figure 5 Continuum of Development



where: A is the non-native development for census division 1,

B is the non-native development for census division 2,

a is the native development for census division 1, and

b is the non-native development for census division 2.

A measure of dualism is calculated by the difference between the level of native and non-native development in a census division. Therefore, although in the above example the level of native and non-native development is much different for census division 1 and 2, the level of dualism is quite similar. The area of interest in this analysis does not lie in the level of development of natives in a census division relative to all other natives or the level of development of non-natives relative to other non-natives, but in the differences in the level of development between the two groups in the same census division. If the former were the focus, the two groups would be analyzed in two separate principal components analysis and the results compared.

5.3 Native and Non-Native Dualism in Canada

There are four major sections in the analysis of dualism in Canada. The first provides a comparison of the mean values for the eleven variables to be used in the analysis. The second section presents the results of the principal components analysis including the variables comprising each component and the provincial summaries of the level of dualism. The pattern of dualism is identified and

discussed in section three, while the most and least dualistic census divisions are examined in the final section.

5.3.1 Native and Non-Native Descriptive Statistics

In Table 12, the mean value for natives and non-natives for each of the eleven variables are presented. This table indicates considerable differences in the socio-economic conditions for the two groups.

Table 12 Comparison of Native and Non-Native Mean Values

Variable	Native	Non-Native
% Unemployed	17.57	7.16
% in Labour Force	51.11	64.74
% Lone Parent Families	20.29	9.47
% with No Income	23.89	15.23
% with < Grade 8	34.86	20.09
Average Income	8383.69	12955.26
% of Pop. < 20 Years Old	50.78	33.62
% of Houses with Central Heating	71.57	87.67
% of Houses Needing Major Repairs	17.83	7.87
% with < \$2000 Income	22.16	12.37
# of Births per 1000 Pop.	25.01	16.03

All variables reveal the differences in the developmental conditions between natives and non-natives but three in particular deserve further mention. Unemployment in 1981 among non-natives averaged 7.2% while the average native unemployment was 17.6% which is 144% higher. The percentage of residents with less than a Grade 8 education was 73.5% greater among native residents than non-native residents. Finally, the average income among non-native people in Canada is 55% higher than the average income of native peoples.

These simple descriptive statistics reveal a level of dualism between native and non-native residents in Canada. The question now needed to be examined is whether or not dualistic conditions between natives and non-natives are uniform across the country and if not, is there a distinct pattern of dualism in Canada?

5.3.2 Principal Components Analysis

The Kaiser-Meyer-Olkin measure of sampling adequacy for the dualism analysis is 0.884 which again is well above the 0.60 acceptable level suggested by Kaiser (Kaiser, 1974, p. 34). The Bartlett Test of Sphericity has a value of 2942.87, which is much higher than the score for the analysis of native development and is again significant at less than the 0.0001 level. These tests indicate that this data matrix is well suited for principal components analysis.

The principal components analysis of the eleven variables by 280 census divisions results in two components accounting for 74.4% of the variation in the original data matrix. The communalities, which indicate the proportion of the variation in each variable accounted for by the two components, are somewhat higher for this analysis compared to the native development analysis. Over 86% of the variation is accounted for by the two components for the percentage in the labour force variable which is the highest communality. The lowest communality is for the unemployment variable which has 60% of the variation accounted for by the two components.

The variables comprising the two components with the factor loadings for each variable are provided in Table 14. The factor loadings are interpreted in a

Table 13 Communalities of the Variables for Analysis of Dualism

Variable	Communality
% Unemployed	.603
% in Labour Force	.866
% Lone Parent Families	.844
% with No Income	.718
% with < Grade 8	.807
Average Income	.785
% of Pop. < 20 Years Old	.833
% Houses with Central Heating	.653
% Houses Needing Major Repairs	.716
% with < \$2000 Income	.731
# of Births per 1000 Pop.	.623

similar fashion to correlation coefficients. The loadings on the first component range from a high of -0.90 for the percentage of residents in the labour force to a low of 0.61 for the income distribution variable. Only four variables loaded on the second component with percentage of lone parent families having the strongest loading at 0.92. The lowest loading for the second component is for the birth rate at 0.57.

Component I has seven variables loaded upon it and is named the *modernization* component. This component has the percentage in the labour force, average income and the percentage of houses with a central heating system loaded negatively upon it. Variables loading positively include the percentage with low education, low or no income and the percentage of households needing major repairs. The sign of the *modernization* factor scores are reversed in order to maintain consistency with the previous section where high factor scores were associated with good developmental conditions.

Table 14 Components and Factor Loadings for Dualism Analysis

Components	Factor Loadings
Modernization	
% in Labour Force	-.901
% with < Grade 8	.888
% Houses with Central Heating	-.786
% with No Income	.760
% Houses Needing Major Repairs	.738
Average Income	-.723
% with < \$2000 Income	.608
Demographic	
% Lone Parent Families	.919
% of Pop. < 20 Years Old	.673
% Unemployed	.589
# of Births per 1000 Pop.	.570

Component II is named the *demographic* component and all four variables loaded positively on it. The variables are the percentage of lone parent families, the percentage of the population under twenty years old, the birth rate and the unemployment rate. The sign of this component's scores is changed in order to have the higher scores associated with good developmental conditions.

To calculate the level of dualism in each census division, the two factor scores are added to provide a development measure for natives and non-natives in each census division. The difference between the native and non-native development measure is an indicator of the level of dualism. The native and non-native development measure and the level of dualism for each census division is provided in Appendix B.

5.3.3 The Pattern of Dualism

The first step in the identification of a pattern of dualism is to examine the provincial averages for the dualism which has been computed. The provincial averages for the native and non-native development levels and the level of dualism are provided in Table 15.

Table 15 Provincial Native and Non-Native Level of Development and Degree of Dualism

	Native	Non-Native	Dualism
Quebec	- 0.86	0.84	1.70
Ontario	- 0.84	1.28	2.12
Alberta	- 1.04	1.39	2.43
Atlantic Region	- 1.85	0.60	2.45
British Columbia	- 1.15	1.41	2.56
Manitoba	- 1.81	1.16	2.97
Saskatchewan	- 1.89	1.26	3.15
Yukon / N.W.T.	- 1.45	2.30	3.75

The region with the most extreme dualism is clearly the Canadian north. Although the developmental conditions for natives are not that bad relative to other natives in Canada, the non-native development is quite high. This result is not overly surprising as there are many young professionals working in the north where salaries are considerably higher. The second most dualistic province is Saskatchewan where there are extremely poor conditions for native people and relatively good conditions for non-natives. In Manitoba conditions are only slightly better for natives and slightly worse for non-natives than in Saskatchewan which

results in a smaller level of dualism. British Columbia has the fourth highest average level of dualism.

The fifth highest level of dualism is found in the Atlantic Region of Canada. This area is one where both the natives and non-natives have low development levels relative to other natives and non-natives respectively. The non-natives have the worst average measure of development while the natives of the Atlantic Region have the second worst development measure with the result being a relatively lower level of dualism. In Alberta, the opposite is the case as both the non-natives and natives have relatively good levels of development and lower dualism.

The two provinces with the least dualistic conditions are Ontario and Quebec. Quebec has the least dualism between native and non-native residents with an average dualism measure of 1.70. Both provinces have among the highest developed natives in Canada while Quebec's non-natives have, on average, lower developmental levels than non-natives in other regions of Canada.

The overall pattern of dualism by census division is presented in Figure 6. The average level of dualism is 2.47 and the standard deviation is 0.83 for the 140 census divisions in this analysis. The classification system for the mapping of the spatial pattern is similar to that used for native development in Canada. The four classes are: (1) census divisions with dualism greater than one standard deviation above the mean, (2) census divisions with dualistic conditions within one standard deviation greater than the mean, (3) census divisions with a level of dualism between the mean and one standard deviation less than the mean, and (4) those census divisions whose dualism is greater than one standard deviation less than the mean level of dualism.

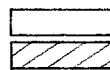
The frequency distribution indicates that similar to the native development classification scheme, this classification of level of dualism approximates a normal distribution. This scheme is especially useful in identifying groups one and four which are the census divisions where there is especially high levels of dualism and census divisions where there are extremely low levels of dualism.

Spatial Variations of Dualism in the Western Provinces and the Territories

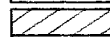
Figure 6(a)



Dualism



Inapplicable



Above Average



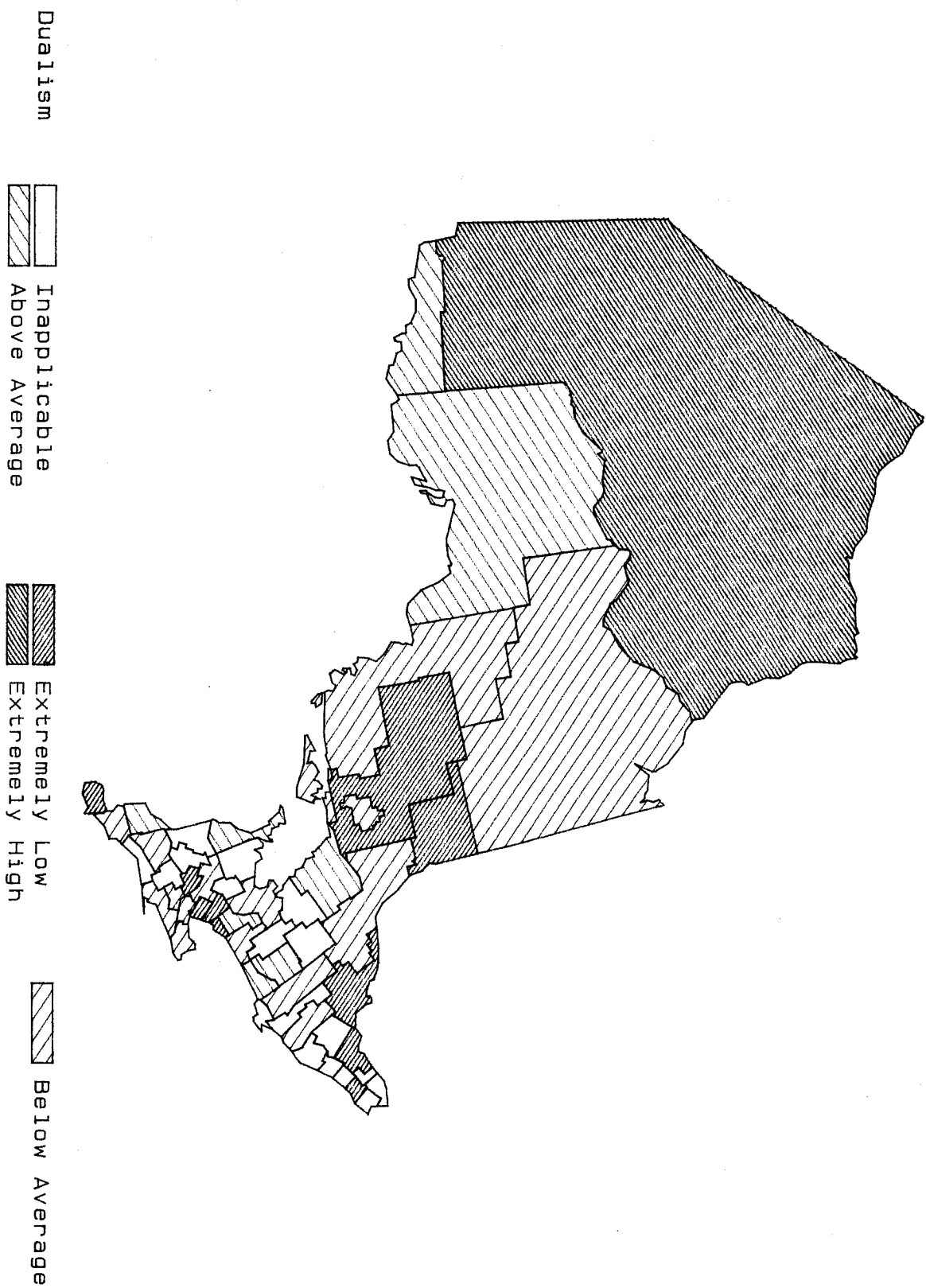
Below Average



Extremely High

Spatial Variations of Dualism in Ontario

Figure 6(b)



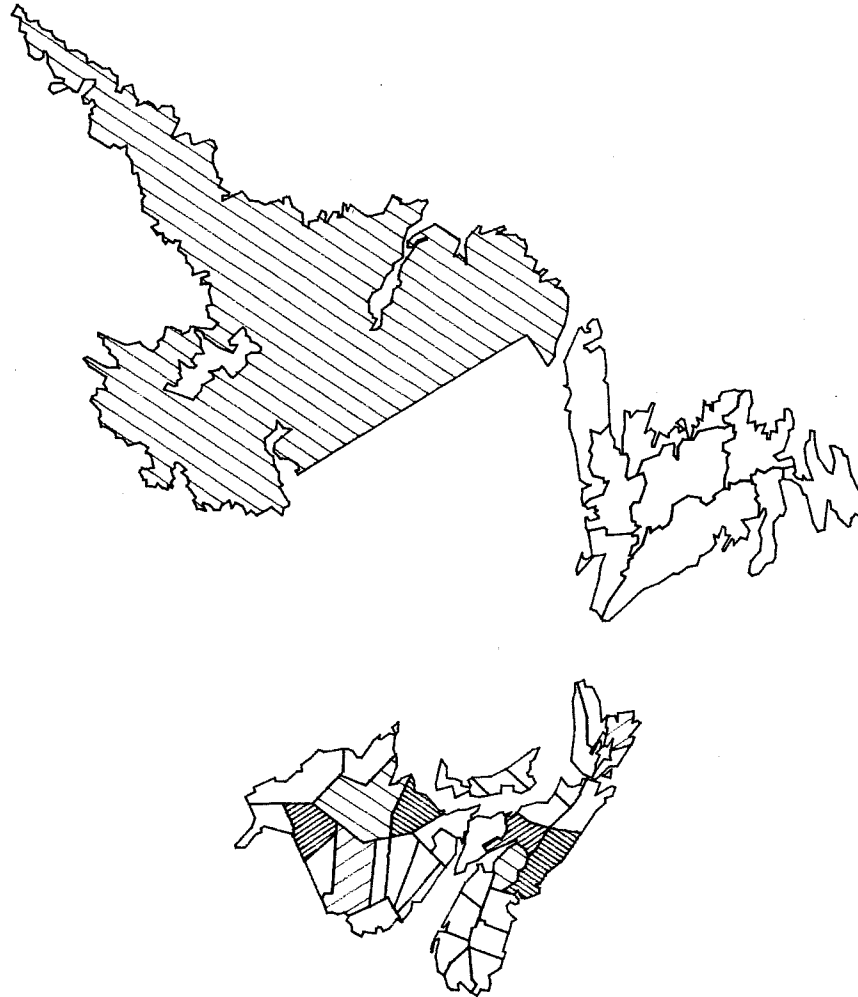
Spatial Variations of Dualism in Quebec

Figure 6(c)

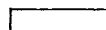
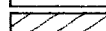




Spatial Variations of Dualism in the Maritimes

Figure 6(d)



Dualism

 Inapplicable
 Above Average

 Extremely Low
 Extremely High


 Below Average

Table 16 Classification of Dualism in Canada

	Class	Frequency	Percent
Extremely High Dualism	3.30 to ∞	18	12.9
Above Average Dualism	2.47 to 3.29	54	38.6
Below Average Dualism	2.46 to 1.64	46	32.9
Extremely Low Dualism	-∞ to 1.63	22	15.7

Several important points should be noted about the overall pattern of dualism between native and non-native residents in census divisions in Canada. The first and most obvious is the concentration of the census divisions with extremely low levels of dualism in southern Ontario and southern Quebec. Of the twenty-two census divisions which fall in this class only two are not in either Quebec or Ontario. There are no census divisions in any of the provinces east of Ontario with the extremely low levels of dualism found in this category.

Those census divisions with slightly lower than average dualism are also concentrated in eastern Canada, although some of the 46 census divisions in this class are found in the west. The two categories indicating the census divisions where dualism is lower than the average level of dualism in Canada indicate that, generally, lower levels of dualism are found in large urban centers in Canada. This is reflected when noting that the cities such as Halifax, Quebec City, Montreal, Toronto, Winnipeg, Calgary, Edmonton, Vancouver and Victoria are included in these two categories.

The census divisions with the most extreme levels of dualism are not as concentrated as those with extremely low levels of dualism, although it does appear that many of the census divisions with extreme dualism are in the northern parts of the provinces and in the territories. This north/south pattern of dualism is

further supported by the locations of census division with slightly higher than average dualism. The one province which deserves further mention is Saskatchewan. All census divisions in Saskatchewan have levels of dualism higher than the national average. As will be noted in the next section, Saskatchewan has some of the census divisions with the most extreme dualism in Canada.

5.3.4 The Most and Least Dualistic Census Divisions

The overall pattern of dualism between natives and non-natives in Canada is reflected in the ten most and least dualistic census divisions. Among the ten least dualistic eight are in Quebec while one is from New Brunswick and one from Ontario. The Laprairie census division in Montreal is the only census division in Canada where the native development level is higher than the non-native development measure. However, both measures are quite high revealing the overall good conditions in the census division. In fact, of the ten least dualistic census divisions in Canada, eight are in Quebec and with six from the Montreal region. The total number of natives in these six census divisions in the Montreal region is 14,780 and although this a relatively small number compared to the 2.7 million non-natives living in these six census divisions, these natives are among the most developed in Canada.

Also in the top ten from Quebec is the Quebec City census division. As well, the Hull, Quebec and Ottawa-Carleton census divisions are among the least dualistic. Kent County in New Brunswick rounds out the ten least dualistic although, unlike the other nine, this census division has a low dualism measure because the developmental levels are low for both natives and non-natives.

Among the ten most dualistic census divisions, three are in the Northwest Territories, two in Manitoba and Saskatchewan, and one each in New Brunswick, Quebec and British Columbia. Three census divisions in the Northwest Territories are among the four most dualistic in Canada. The explanation for the extreme dualism is twofold: (1) the somewhat, although not extreme, low developmental conditions among natives, and (2) the extremely high developmental measures for

Table 17 The Ten Most and Least Dualistic Census Divisions

Least Dualistic		Most Dualistic	
1. Laprairie (Que)	- 0.10	1. Baffin Region (N.W.T.)	4.56
2. Ile-Jesus (Que.)	0.17	2. Victoria County (N.B.)	4.45
3. Quebec (Que.)	0.49	3. Central Arctic Reg (N.W.T.)	4.34
4. Ile-de-Montreal (Que.)	0.62	4. Keewatin Region (N.W.T.)	4.27
5. Hull (Que.)	0.78	5. Division No. 20 (Man.)	4.20
6. Chambly (Que.)	0.78	6. Maskinonge (Que.)	3.87
7. Deux-Montagnes (Que.)	0.85	7. Division No. 1 (Sask.)	3.87
8. Kent County (N.B.)	0.96	8. Division No. 14 (Sask.)	3.79
9. Terrebonne (Que.)	1.01	9. Stikine Region (B.C.)	3.75
10. Ottawa-Carleton Munic. (Ont.)	1.21	10. Division No. 22 (Man.)	3.71

non-natives in the north. For example, among the ten most dualistic census divisions the development measures for natives are best in the three N.W.T. census divisions. At the same time the development measures for non-natives in these three census divisions are among the highest in Canada resulting in the high dualism. Also in the ten most dualistic census divisions are Maskinonge in Quebec and Victoria County in New Brunswick which were identified as the two census divisions with the least developed natives in Canada in the previous chapter.

6. CONCLUSIONS

The primary purpose of this thesis has been to examine the use of the indicator approach to create a measure of development which encompasses both the economic and social dimensions of development. The secondary purposes have been: (1) to use the indicator approach to examine spatial variations in the level of development of native peoples in Canada, and (2) to also use the indicator approach in examining spatial variations in the level of dualism between native and non-native residents of Canada.

6.1 The Indicator Approach to Measuring Development

Several concluding statements may be made regarding the indicator approach to measuring development and the principal component technique utilized in this thesis.

First, the principal components technique for computing the overall development indicator provides a statistical solution to the chronic problem of weighting which has hampered other measures of overall development using the indicator approach. However as discussed earlier, this is a statistical solution and not one based in development theory. With improvements in understanding of the complicated relationships between the economic and social dimensions of development, a more theoretical weighting system may be devised.

The nature of the measure provided by this technique makes interpretation of a development measure for an individual census division simpler. The measure of native development for the 140 census divisions approximates a standard normal distribution with a mean value of zero. This is an extremely useful approach, allowing the level of development of the natives residing in a particular census division to be easily identified as above or below the national average by the sign of the development measure. Knowledge of the standard normal distribution also reveals the magnitude of the deviation from the average that a census division lies.

One of the difficulties of the indicator approach to measuring development is

the problems presented by the constraints of data availability and choice of variables. This problem is common to many studies as the researcher is constrained by the variables and types of data collected by the national census. The indicator approach to measuring development used in this thesis may be most valuable for measuring regional variations in development within a developed nation. The reason for this is the relatively wide ranging and sophisticated data collection which are intermittently completed in most of the more highly developed nations of the world. Also, consistent data collection techniques and variable definitions present problems when comparisons between nations are attempted. The problems relating to data comparability are present regardless of the development measure which is used when examining variations in development at an international scale.

The lack of popularity of the indicator approach to measuring development relates to the complexity of the methodology and the problems relating to data. Researchers often want a measure of development which is easily computed and interpreted as well as readily available. However, although the technique is somewhat complex, if a researcher wants to examine spatial variations in the level of development in its socio-economic totality, then the indicator approach and the principal components technique should be used.

6.2 Spatial Variation in Native Development

One of the secondary purposes of this thesis has been to use the indicator approach to compute a measure of development to identify the spatial variations in the level of development of native peoples in Canada in 1981.

A definite spatial pattern in native development exists in Canada. On average, the most highly developed natives reside in Ontario, while the least developed natives are in Saskatchewan. A somewhat surprising result of this analysis is the relatively high level of development among native people in the two northern territories. Although natives in the north have poor conditions on some specific variables, for example, education, the overall the level of development is

relatively good.

The analysis of native development at the census division level has led to the conclusion that a clear urban/rural pattern exists. The most highly developed natives in Canada live in areas of population concentration such as Halifax, Quebec City, Montreal, Toronto, Calgary, Edmonton, Vancouver and Victoria. Even in provinces with low overall development, urban centers such as Winnipeg and Saskatoon have relatively higher development than the surrounding rural areas. The census divisions with natives with the lowest levels of development are concentrated in rural Saskatchewan, Manitoba and Quebec (see Figure 4).

6.3 Native and Non-Native Dualism in Canada

The other secondary purpose of this thesis has been to use development indicators to analyze the spatial variations in the differences between the level of development of natives and non-natives within census divisions in Canada.

The spatial pattern of dualism reveals that, on average, the lowest levels of dualistic conditions are found in Quebec, while the highest are clearly in northern Canada. At the census division level there is, again, a rural/urban split with the lowest levels of dualism being found in the large urban centers and southern Ontario and Quebec.

6.4 Future Research

This thesis has utilized the indicator approach to measuring development to identify the spatial patterns in native development and dualism between native and non-native Canadians. In the examination of native development and the spatial variations in the level of dualism in Canada it has become apparent that the level of development of natives is much higher while the level of dualism much lower in areas of population concentration such as large urban centers and in central Canada.

Explanation of these patterns has not been the focus of this thesis although

this should be central to further research into spatial variations in native development and dualism between native and non-native Canadians. Two potential processes which could provide an explanation of these spatial patterns are assimilation and accessibility. The relationship between these two processes and the spatial variations in native development and dualism are briefly examined now, although this this brief discussion is intended only to give direction for further investigation.

6.4.1 Assimilation

Anderson and Frideres suggest that the relationship between a dominant society and an ethnic minority may range along a continuum from full assimilation to integration (Anderson and Frideres, 1981, p. 265). Full assimilation refers to total acceptance of the dominant culture in all of its social dimensions while integration refers to a process whereby elements of a society are brought into an active and coordinated compliance with the ongoing activities and objectives of the dominant group (Anderson and Frideres, 1981, pp. 273 and 284). In the following discussion, the term assimilation is used to reflect this notion of a continuum. Whether the assimilation involves the total acceptance of the dominant culture or changes to both cultures to allow for the accommodation of the minority group within the dominant is not the essential point. Rather, the likelihood or potential for assimilation is of more significance and this may be represented by the proportion of all residents which are native.

The likelihood of native residents changing traditional values is related to the proportion of natives residing in a census division. Because the higher likelihood of accepting the culture and economic structure of the non-native society one would expect natives living in census divisions with a low proportion of native people to have higher levels of development. This relationship is supported when noting a correlation coefficient between the level of development of the native residents and the proportion of the total population which is native of -0.39 which is significant at 0.001. This correlation suggests that as the proportion of the total population which is native declines the level of development of those natives increases. This

indicates that assimilation plays a role in the development of the native population and that the existing spatial pattern of development reflects this relationship.

Further evidence to support the role of assimilation is indicated when the 140 census divisions applicable to this study are divided into two on the basis of the median proportion of native residents. In the 70 census divisions where there are less than the median proportion of native people, native development averages 0.94 while the proportion of native people with less than Grade 8 averages 24.8% and the average income is \$9,000. In the 70 census divisions with greater than the median proportion of native residents, the average native development level is -0.94 while the average proportion of natives with less than Grade 8 is 44.9% and the average income is \$7759. There is an apparent relationship between assimilation and native development which helps to further understand the higher level of development of native people living in eastern Canada and large urban centers.

6.4.2 Accessibility

The other process which may help in explaining the spatial variations in native development and dualism is accessibility. In order for a native family, or any other Canadian, to improve their economic or social situation they must have access to the tools for improvement. For example, if there is no high school in the community there is a much lower probability of a resident obtaining a high school diploma. By the same logic, the fewer the jobs available in a community the more difficult it is to locate a job. The hypothesis being suggested is that the greater the accessibility to social and economic opportunities, the higher the level of native development. An indicator of accessibility is the size of the census division, in terms of population. It is assumed more populated census divisions have greater accessibility to social and economic opportunities because of the larger infrastructure. The relationship between the overall population of the census division and native development turns out to be 0.47 which is again significant at 0.001. This indicates that the greater the total population in a census division, the higher the level of development of native peoples.

Further support of the relationship between accessibility and native development is provided by again dividing the 140 census divisions into two groups on the basis of the median population of census divisions. In census divisions which are larger than the median, the average native development is 0.98 while in census divisions with populations smaller than the median, the average native development is -0.98.

It is apparent that native development is higher and the level of dualism lower in large urban centers and in eastern Canada. The processes of assimilation and accessibility provide two potential explanations for this spatial pattern although more research is required to substantiate this.

6.5 Concluding Comments

The indicator approach to measuring development which has been presented in this thesis is a valuable tool in the analysis of spatial variations in development. It is a necessary procedure for researchers who wish to examine development in its socio-economic totality. This does not diminish the importance of research into specific dimensions of development, although simple economic measures, like income, should no longer be taken to represent overall development.

Native development and dualism between natives and non-natives do vary spatially in Canada. Clearly, further study is required into the processes which have resulted in higher native development and lower dualism in the large urban centers of Canada. Two processes, assimilation and accessibility, are suggested as possible reasons for the spatial patterns which exists and this provides a good starting point for research into the explanation of these patterns.

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Appendix A
Level of Development and Component Scores
for Natives by Census Divisions

Name	Modernization	Economic & Demographic	Mobility & Participation	Overall Development
Atlantic Region				
Division No. 10	-1.20	.09	-.43	-1.54
Hants County	.54	-.62	-.63	-.71
Halifax County	.83	.69	.79	2.31
Colchester County	1.97	-1.80	-.70	-.54
Cape Breton County	-1.10	-.75	-.75	-2.61
Kent County	-1.26	1.11	-.59	-.74
Northumberland County	-.60	-.58	-.63	-1.81
York County	.36	-.79	-.30	-.73
Victoria County	1.84	-2.74	-3.44	-4.34
Quebec				
Bonaventure	.16	.46	-2.90	-2.29
Quebec	.31	2.39	-.14	2.57
Champlain	-1.22	.76	-.80	-1.26
Maskinonge	-2.25	-.15	-2.38	-4.78
Chambly	1.02	1.86	.45	3.33
Terrebonne	.89	1.61	.00	2.50
Ile-Jesus	-.50	3.13	.64	3.26
Ile-de-Montreal	.12	1.94	.83	2.89
Laprairie	-1.11	3.67	.42	2.99
Huntingdon	-.25	.59	-1.54	-1.20
Deux-Montagnes	.10	2.57	-1.26	1.41
Gatineau	1.20	1.18	-1.98	.40
Hull	.95	2.10	-.20	2.86
Pontiac	-.56	.54	-1.96	-1.99
Temiscamingue	.77	.28	-1.19	-.14
Abitibi	-1.30	-1.13	-.06	-2.48
Lac-Saint-Jean-Ouest	.04	1.00	-1.41	-.37
Chicoutimi	1.11	.51	-1.15	.46
Saguenay	-2.02	.51	-1.32	-2.84
Territoire-du-Nouveau-Quebec	-2.98	.25	.35	-2.38
Ontario				
Stormont County	-.34	.78	-.11	.32
Ottawa-Carleton Regional Munic.	.59	1.22	1.52	3.33

Frontenac County	1.30	.56	.43	2.29
Hastings County	1.03	.15	-.65	.53
Northumberland County	1.36	.14	-.64	.85
Peterborough County	.96	-.13	-.20	.63
Durham Regional Municipality	1.14	.86	1.12	3.12
York Regional Municipality	.75	.09	.58	1.42
Toronto Metropolitan Municipal.	.29	1.25	1.27	2.82
Peel Regional Municipality	.66	1.09	1.76	3.51
Wellington County	1.76	-.36	1.41	2.81
Halton Regional Municipality	.91	1.02	1.28	3.21
Hamilton-Wentworth Regional Mun	.86	.23	.38	1.48
Niagara Regional Municipality	.99	.55	-.17	1.37
Haldimand-Norfolk Regional Mun.	.70	.87	-.59	.98
Brant County	.25	.74	-.59	.39
Waterloo Regional Municipality	.56	.82	1.63	3.01
Kent County	.81	.23	-.03	1.01
Essex County	.87	1.13	.01	2.01
Lambton County	.34	.19	-1.06	-.53
Middlesex County	.89	.01	-.15	.75
Bruce County	.48	-.59	-.90	-1.02
Simcoe County	.95	-.21	.22	.95
Renfrew County	.59	.46	-.12	.92
Nipissing District	.84	.57	-.93	.48
Parry Sound District	1.36	-.53	-.78	.04
Manitoulin District	-.33	.17	-1.36	-1.52
Sudbury District	-.34	.29	-.27	-.33
Sudbury Regional Municipality	1.05	.15	-.12	1.08
Timiskaming District	-.47	-.18	1.05	.39
Cochrane District	-.99	.33	-.22	-.88
Algoma District	-.07	.57	-.35	.15
Thunder Bay District	.33	-.38	-.04	-.09
Rainy River District	.30	.05	-1.09	-.74
Kenora District	-1.25	-.58	.10	-1.73

Manitoba

Division No. 1	.47	-.04	-.05	.38
Division No. 2	.31	-1.35	.99	-.05
Division No. 6	-.27	-.40	-1.57	-2.24
Division No. 7	.73	-2.21	1.92	.44
Division No. 8	-1.45	-1.45	-.17	-3.07
Division No. 9	.26	-1.01	.94	.18
Division No. 11	.23	-.48	.86	.61
Division No. 13	.69	.86	-.22	1.33
Division No. 15	.05	-1.23	.54	-.63
Division No. 16	-.01	-1.36	-.21	-1.59
Division No. 17	.37	-.91	-.64	-1.18
Division No. 18	-.74	.02	-.32	-1.04

Division No. 19	-.56	-.91	-1.46	-2.93
Division No. 20	.37	-1.90	-1.42	-2.95
Division No. 21	-.77	-.22	.15	-.84
Division No. 22	-1.34	-.70	-.29	-2.33
Division No. 23	-2.04	-.44	.32	-2.16

Saskatchewan

Division No. 1	-.64	-2.03	-.22	-2.89
Division No. 5	-.69	-.23	.17	-.76
Division No. 6	.29	-1.08	.68	-.11
Division No. 7	1.60	-1.47	.58	.71
Division No. 9	-.46	-1.34	.47	-1.33
Division No. 10	-.92	-.98	-.51	-2.41
Division No. 11	.44	-1.14	1.45	.75
Division No. 12	-.08	-1.26	-.71	-2.05
Division No. 13	-1.66	-.54	-.14	-2.34
Division No. 14	-.77	-1.16	-.61	-2.54
Division No. 15	.14	-1.14	.18	-.81
Division No. 16	-.96	-.95	.13	-1.77
Division No. 17	-1.19	-.97	.36	-1.80
Division No. 18	-2.00	-.05	.02	-2.04

Alberta

Division No. 2	.57	-2.03	2.54	1.07
Division No. 3	-.62	-.32	-.49	-1.43
Division No. 5	-3.22	1.49	.73	-1.01
Division No. 6	.29	.19	2.18	2.65
Division No. 8	-.85	-.29	2.07	.94
Division No. 10	.47	-1.10	2.00	1.37
Division No. 11	.08	-.17	1.92	1.83
Division No. 12	-.88	-.29	.49	-.69
Division No. 13	.36	-.21	.81	.95
Division No. 14	-.50	.93	.58	1.02
Division No. 15	-1.11	-.17	.42	-.86

British Columbia

East Kootenay Regional District	.88	-.44	.61	1.05
Central Kootenay Reg. District	.67	.04	1.18	1.90
Okanagan-Similkameen Reg. Dist.	.22	.43	.18	.83
Fraser-Cheam Regional District	.54	-.39	.10	.24
Central Fraser Valley Reg. Dist	1.41	-.48	.48	1.41
Dewdney-Alouette Reg. District	-.02	.25	1.35	1.58
Greater Vancouver Reg. District	.48	.72	.87	2.07

Capital Regional District	.34	1.07	.80	2.21
Cowichan Valley Reg. District	.09	-.21	.38	.26
Nanaimo Regional District	1.09	-.31	.07	.84
Alberni-Clayoquot Reg. District	.56	-.43	-.77	-.64
Comox-Strathcona Reg. District	.81	-.33	.13	.61
Powell River Regional District	.80	.87	-.66	1.01
Sunshine Coast Regional District	.70	.27	-.29	.69
Squamish-Lillooet Reg. District	-.72	-.05	-.77	-1.54
Thompson-Nicola Reg. District	.06	.11	-.44	-.26
Central Okanagan Reg. District	.23	.49	1.68	2.40
North Okanagan Regional District	.70	-.59	.09	.20
Columbia-Shuswap Reg. District	1.36	-1.22	-.09	.04
Cariboo Regional District	-.47	-.16	.00	-.63
Mount Waddington Reg. District	.52	.42	-.93	.01
Central Coast Regional District	-.01	.77	-1.45	-.69
Skeena-Queen Charlotte Reg. Dis	.06	.56	-.06	.56
Kitimat-Stikine Reg. District	-.08	.33	-1.24	-.99
Bulkley-Nechako Reg. District	-.17	-.49	-.14	-.80
Fraser-Fort George Reg. District	.18	.13	1.01	1.32
Peace River-Liard Reg. District	.07	-.49	.35	-.07
Stikine Region	-.23	-.59	-.29	-1.11

Yukon and Northwest Territories

Yukon	.32	.27	-.13	.46
Baffin Region	-2.81	-.26	1.22	-1.85
Keewatin Region	-2.51	-.73	1.61	-1.63
Fort Smith Region	-.79	.20	-.11	-.70
Inuvik Region	-1.39	.36	-.15	-1.18
Central Arctic Region	-1.85	-.28	.88	-1.26

Appendix B
The Level of Dualism in Census Divisions in Canada

Name	Native	Non-Native	Dualism
Atlantic Region			
Division No. 10	-1.46	.73	2.19
Hants County	-1.67	.76	2.43
Halifax County	-.19	1.28	1.47
Colchester County	-2.34	.96	3.30
Cape Breton County	-2.29	.33	2.62
Kent County	-.91	.05	.96
Northumberland County	-1.90	-.02	1.88
York County	-1.64	1.07	2.71
Victoria County	-4.21	.24	4.45
Quebec			
Bonaventure	-2.05	.06	2.11
Quebec	.71	1.20	.49
Champlain	-1.68	.72	2.40
Maskinonge	-3.21	.66	3.87
Chambly	.44	1.22	.78
Terrebonne	.04	1.05	1.01
Ile-Jesus	1.23	1.40	.17
Ile-de-Montreal	.66	1.28	.62
Laprairie	1.44	1.34	.10
Huntingdon	-1.38	.92	2.30
Deux-Montagnes	.11	.96	.85
Gatineau	-1.43	.90	2.33
Hull	.25	1.03	.78
Pontiac	-2.11	.44	2.55
Temiscamingue	-1.73	.64	2.37
Abitibi	-2.46	.51	2.97
Lac-Saint-Jean-Ouest	-1.32	.30	1.62
Chicoutimi	-1.10	.49	1.59
Saguenay	-1.83	.63	2.46
Territoire-du-Nouveau-Quebec	-1.79	1.10	2.89
Ontario			
Stormont County	-.54	1.01	1.55
Ottawa-Carleton Regional Munic.	.51	1.72	1.21
Frontenac County	-.58	1.38	1.96

Hastings County	-1.15	1.17	2.32
Northumberland County	-1.31	1.31	2.62
Peterborough County	-1.15	1.33	2.48
Durham Regional Municipality	-.18	1.47	1.65
York Regional Municipality	-.72	1.81	2.53
Toronto Metropolitan Municipal.	.47	1.75	1.28
Peel Regional Municipality	.31	1.74	1.43
Wellington County	-.88	1.46	2.34
Halton Regional Municipality	.26	1.84	1.58
Hamilton-Wentworth Regional Mun	-.81	1.45	2.26
Niagara Regional Municipality	-.69	1.32	2.01
Haldimand-Norfolk Regional Mun.	-.61	1.31	1.92
Brant County	-.90	1.36	2.26
Waterloo Regional Municipality	.08	1.49	1.41
Kent County	-1.03	1.10	2.13
Essex County	-.31	1.14	1.45
Lambton County	-1.17	1.42	2.59
Middlesex County	-.93	1.53	2.46
Bruce County	-1.93	1.27	3.20
Simcoe County	-1.10	1.33	2.43
Renfrew County	-.55	1.00	1.55
Nipissing District	-1.02	.88	1.90
Parry Sound District	-1.69	.95	2.64
Manitoulin District	-1.54	.74	2.28
Sudbury District	-.95	.59	1.54
Sudbury Regional Municipality	-.97	.99	1.96
Timiskaming District	-.78	.78	1.56
Cochrane District	-1.48	.96	2.44
Algoma District	-1.03	1.19	2.22
Thunder Bay District	-1.49	1.45	2.94
Rainy River District	-1.71	1.19	2.90
Kenora District	-1.91	1.50	3.41

Manitoba

Division No. 1	-1.13	1.06	2.19
Division No. 2	-1.84	.89	2.73
Division No. 6	-2.22	1.12	3.34
Division No. 7	-1.50	1.41	2.91
Division No. 8	-2.41	.90	3.31
Division No. 9	-1.35	1.20	2.55
Division No. 11	-.86	1.59	2.45
Division No. 13	-.75	1.41	2.16
Division No. 15	-1.85	1.30	3.15
Division No. 16	-2.11	.97	3.08
Division No. 17	-1.98	1.01	2.99
Division No. 18	-1.27	.87	2.14
Division No. 19	-2.62	.58	3.20

Division No. 20	-3.28	.92	4.20
Division No. 21	-1.43	1.35	2.78
Division No. 22	-2.20	1.51	3.71
Division No. 23	-2.02	1.65	3.67

Saskatchewan

Division No. 1	-2.54	1.33	3.87
Division No. 5	-1.36	1.19	2.55
Division No. 6	-1.40	1.58	2.98
Division No. 7	-1.65	1.37	3.02
Division No. 9	-1.82	1.13	2.95
Division No. 10	-2.14	.97	3.11
Division No. 11	-1.07	1.49	2.56
Division No. 12	-2.15	1.26	3.41
Division No. 13	-1.85	1.31	3.16
Division No. 14	-2.67	1.12	3.79
Division No. 15	-1.83	1.14	2.97
Division No. 16	-1.79	1.12	2.91
Division No. 17	-2.21	1.19	3.40
Division No. 18	-1.79	1.39	3.18

Alberta

Division No. 2	-1.39	1.42	2.81
Division No. 3	-2.06	1.06	3.12
Division No. 5	-.75	1.40	2.15
Division No. 6	-.09	1.92	2.01
Division No. 8	-.60	1.48	2.08
Division No. 10	-1.23	1.31	2.54
Division No. 11	-.37	1.76	2.13
Division No. 12	-1.45	1.37	2.82
Division No. 13	-1.11	1.14	2.25
Division No. 14	-.85	1.27	2.12
Division No. 15	-1.51	1.18	2.69

British Columbia

East Kootenay Regional District	-1.28	1.36	2.64
Central Kootenay Reg. District	-.63	1.13	1.76
Okanagan-Similkameen Reg. Dist.	-.77	1.59	2.36
Fraser-Cheam Regional District	-1.53	1.37	2.90
Central Fraser Valley Reg. Dist.	-1.28	1.46	2.74
Dewdney-Alouette Reg. District	-.49	1.35	1.84
Greater Vancouver Reg. District	-.12	1.89	2.01
Capital Regional District	-.09	1.88	1.97

Cowichan Valley Reg. District	-1.21	1.37	2.58
Nanaimo Regional District	-1.16	1.51	2.67
Alberni-Clayoquot Reg. District	-1.86	1.41	3.27
Comox-Strathcona Reg. District	-1.30	1.34	2.64
Powell River Regional District	-.96	1.29	2.25
Sunshine Coast Regional District	-.75	1.55	2.30
Squamish-Lillooet Reg. District	-1.67	1.28	2.95
Thompson-Nicola Reg. District	-1.20	1.34	2.54
Central Okanagan Reg. District	-.03	1.61	1.64
North Okanagan Regional District	-1.32	1.25	2.57
Columbia-Shuswap Reg. District	-2.20	1.30	3.50
Cariboo Regional District	-1.48	1.01	2.49
Mount Waddington Reg. District	-1.35	1.55	2.90
Central Coast Regional District	-1.23	1.12	2.35
Skeena-Queen Charlotte Reg. Dis	-.83	1.63	2.46
Kitimat-Stikine Reg. District	-1.73	1.48	3.21
Bulkley-Nechako Reg. District	-1.73	1.05	2.78
Fraser-Fort George Reg. District	-.75	1.29	2.04
Peace River-Liard Reg. District	-1.42	1.20	2.62
Stikine Region	-2.02	1.73	3.75

Yukon and Northwest Territories

Yukon	-.99	1.83	2.82
Baffin Region	-1.83	2.73	4.56
Keewatin Region	-1.77	2.50	4.27
Fort Smith Region	-1.31	1.94	3.25
Inuvik Region	-1.25	2.04	3.29
Central Arctic Region	-1.57	2.77	4.34