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Regional Analysis of Human Development in Canada

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Abstract

Regional imbalances in development occur in most societies. This study is an example of comparing human development across the provinces of Canada. The study has four directions of emphasis: education, economy, health, and society. In this study seventeen variables are investigated, which reflect the various dimensions of human development. These variables are aggregate in nature. Using the **taxonomic method**, the variations among the provinces are examined. The analysis reveals that British Columbia has the highest scores and Newfoundland has the lowest scores on the human development index. The results also show the aspects of human development that are not satisfactory in Canada relate especially to problems in the health care system. The research methodology involves a novel statistical application. The method facilitates the ranking, classification and comparison of the provinces by levels of human development. This study is useful in identifying indicators of spatial imbalances in development with a view to setting up targets in allocating scarce resources. It is hoped that this study will provide new direction for human development in Canada.

Key words: Taxonomic method, human development, Canada, Provinces

Introduction:

The United Nations recognized the need for action for development and designated the decade

of the 1960s as the “United Nations Development Decade.”¹ The efforts of this body were directed to the achievement of a self-sustaining growth of the economy and the social advancement of nations. The preparation of proposals for action during the Development Decade led to a better understanding of the objectives of the development process. It soon came to be recognized “that development concerns not only man’s material needs, but also the improvement of the social conditions of his life and his broad human aspirations. Development is not just economic growth; it is growth plus change”.² More recently, there has been a growing recognition that growth alone is not the answer to development, and that efficiency must be balanced with equity considerations if development is to achieve its ultimate goal of human well-being and a better quality of life for all.

Human development has always remained an issue of concern among philosophers, researchers and policy analysts. Development should begin with the fulfillment of the basic material needs of an individual including food, clothing, and shelter, and gradually reach the highest level of self-fulfillment. The most critical forms of self-fulfillment include leading a long and healthy life, being educated, and enjoying a decent standard of living. Human development is a multidimensional concept comprising four dimensions: economic, social-psychological, political & spiritual. Acquiring various stages of human development does not always follow the developmental pattern as theoretically envisaged, moving from economic to psychological to political and then to spiritual. It is not uncommon to find that individual communities in a country can exhibit different dimensions of development without having achieved the earlier step. In other words, acquisition of one dimension is not contingent upon the acquisition of other dimensions. “The best way to achieve human development is to promote more equitable economic

¹ United Nation, The United Nations Development Decade, Proposals for Action, E/3613, New York: 1962, p.iii.

² Ibid., p.v.

growth and more participatory development”(Human Development Report, p3, 1991).

Measuring human development is a complex task. Two ways of assessing social well-being and its changes have been suggested. “One is to measure the constituents of well-being (utility, freedoms etc.), and the other is to value commodity determinants of well-being (goods and services which are inputs in the production of well-being). The former procedure measures ‘output’ (e.g. indices of health) and the latter evaluates and aggregates ‘inputs’ (e.g. real national income)” (Dasgupta, chapter 4, p75, 1993). Quantitative indicators are essential for identification of points of departure for more intensive qualitative inquiries. They are initial guideposts for development planning. The primary focus is on levels and quantitative measures of human development.

In 1990, the UNDP proposed a new measure of development, the human development index (HDI). It combined national income with social indicators such as adult literacy and life expectancy, to give a composite measure of human progress. The human development index (HDI) greatly helps in the measurement and comparison of socioeconomic development in different countries. In 1997 the United Nations Human Development Report placed Canada, first among 175 nations on its human development index.

The human development index (HDI) incorporates three dimensions of “human development”: health, education and economy. Development must satisfy everyone’s needs. Every country must invest in the education, health, nutrition and social well-being of its people. Problems begin when we try to compare two or more regions on the basis of human development. It is possible that one region is superior in one dimension and another region is superior in another dimension. In a large economy like Canada, which has manifold differences in the levels of development within the economy itself, the primary emphasis should be to make intra- and inter-regional comparisons to help plan for the reduction

of imbalances in development. “People must be at the centre of human development. Development has to be woven around people, not people around development. It has to be development of the people, by the people, for the people” (Human Development Report, Chapter 1, P13, 1991).

In this study we have attempted to develop a composite index of human development for various provinces of Canada which may form the basis of making comparisons of human development amongst different regions/provinces. The present study is largely based on the concepts proposed by UNDP (1990). We chose different method (Taxonomic method) and 17 indicators for calculating the human development index (HDI) for the provinces of Canada. A detailed explanation of this HDI and its indicators will be presented. The purpose of the present study is to describe the taxonomic method and demonstrate its application through a quantitative analysis of human development in different provinces of Canada.

Regional development

Historical developments can be especially important in the making of regional comparisons. It is difficult to form an appraisal of the present without some understanding of the past and the factors and policies which have contributed to current situations and attitudes.

The strengthening and maintaining of national unity has been a dominant objective of federal governments in Canada since the time of Confederation in 1867. The depression of the 1930s underlined the regional differences within the country. Distress was especially severe in the Prairies (Manitoba, Saskatchewan and Alberta) which were heavily dependent on export markets. In 1962, legislation was passed fostering the economic growth and development of the Atlantic region of Canada. Legislation established the ADA (Area Development Agency) in 1963 in order to increase economic development in designated geographic areas characterized by heavy and chronic unemployment. The

establishment of DREE (Department of Regional Economic Expansion) in 1969 was a major step in the evolution of Canadian policies of regional development.

Canada is home to a diverse group of people characterized by different languages, customs, traditions, religions, life-styles or habits. Each region has its unique feature, which is very important in studying any aspect of human society (Davis. 1973). One of the conventional ways of viewing the country is to see it in terms of five main regions:

1. The Atlantic region, consisting of the four most easterly provinces- Newfoundland, Prince Edward Island, Nova Scotia and New Brunswick; 2. Quebec, with its predominantly French-speaking population and culture; 3. Ontario, the largest province in terms of population and industrial output; 4. The three Prairie Provinces - Manitoba, Saskatchewan and Alberta; 5. The most westerly province, British Columbia. These regions are separated not only by geographic distance but also by other dissimilarities. The two Territories are Northwest Territories and Yukon Territory.

Objectives:

In this study four types of inter- provincial comparisons are attempted: educational development, health development, economic development, and overall human development

Description of variables and their dimensions:

An index needs to be derived from a set of suitable variables and used as a criterion for measuring levels of development the existing literature demonstrates considerable controversy regarding appropriate indicators. For example, Gross National Product or Gross Domestic Product has been the most often used indexes to compare the levels of development in different countries/regions. But Gross National Product or Gross Domestic Product may increase while per capita income declines. There have been allegations that such measures reveal only part of the situation and they avoid real issues.

Similarly, other macro-economic variables like productivity and investment pose difficulties involved in the aggregation of heterogeneous entities.

Several attempts have been made to develop better indices to macro-economic variables. Rao (1973), for example, used a multivariate factor analysis approach for measuring economic distance between the states in India. Bernet (1951) constructed the index of development to focus attention on international disparities. Dasgupta (1971) considered some of the indicators for classifying the various districts of India on a ranking basis and used discriminant analysis. Although these indices vary in their method of construction and scope, some of them enable us only to compare the levels of development of different regions. The taxonomic method enables us to construct such an index.

The human development index (HDI) of the UNDP consists of three indicators: life expectancy, education and income. The human development index measures the average achievement of a region in basic human capabilities. The HDI indicates whether people lead a long and healthy life, are educated and knowledgeable, and enjoy a decent standard of living. It is based on a country's position along a range of maximum and minimum values for each indicator of human development. The HDI is a reliable measure of socioeconomic achievements for international comparisons.

This study contains 17 indicators that measure three dimensions of human development: education, health and economy, which are presented in Table A. The reason for not selecting some other indicators was that data were not readily available. In all, 17 variables are considered; they reflect the best quality of life.

Owing to data limitations, the study relates to the early 1990s since most of the pertinent information is available only for that period rather than the current period. However, this situation should not be of much concern in assessing a slowly changing society like Canada where drastic social changes

normally do not occur over a short period.

Variables 1-7 represent the situation with regard to education; variables 8-12 are health indicators; and 13-17 economic indicators relevant to human development. The detailed descriptions of these indicators are given below.

Education:

Education develops physical and intellectual faculties. Education is a process that has many facets. It can enhance the quality of life and the lives of individuals. Education is a key to every type of development.

Canadians have traditionally attained a higher level of education from generation to generation. During 1993-94, an estimated 6,313,510 Canadians, slightly less than a quarter of the population, were enrolled full time in educational institutions. The total enrolment in universities, including both full and part-time students, consisted of 793,750 undergraduates and 119,897 graduate students. Although the education systems in the provinces are similar in many respects, the differences reflect the circumstances of regions separated by great distances and of the diversity of the country's historical and cultural heritage.

The **reading skills** and **numeracy skills** are accepted indicators of human development. Literacy skills are basic tools for communication. "Life-long learning skills allow individuals not only to develop professional skills but lead to a better understanding of the multiple facets of daily living in a complex environment" (Statistics Canada, 1989). In recent years, technological progress and organizational changes have increased the basic qualifications for many entry-level jobs. As a result, there are growing concerns that people without adequate reading skills will not be able to compete in an increasingly complex job market. Literacy is an important skill if one is to participate fully in modern

society.

The majority of Canadian adults have reading abilities, which allow them to deal with most everyday requirements (Statistics Canada, 1989). People with higher levels of education are most likely to have adequate reading abilities. In 1989, 89% of those who had attended university and 81% who had gone to community college could handle most everyday reading requirements. However, some people with higher levels of education had less than adequate reading skills. For example, in 1989, 8% of people who had attended university, 15% of those who had been to community college, and 22% of high school graduates could handle simple reading material, but did not have the skills to cope with more complex contexts (Statistics Canada, 1989).

The majority of Canada's adult populations have numeracy skills sufficient to handle most everyday problems. The Survey of Literacy Skill used in Daily Activities tested Canadians' numeracy abilities. The results were somewhat similar to those for reading skills. In 1989, 62% of people aged 16-69 could meet most daily numeracy requirements. The numeracy section of the survey excluded people who did not have skills in either English or French, as well as people who were not asked to take the test because of their limited reading skills. These two indicators measure abilities that are important for development.

University education is only a crude reflection of access to education, particularly to the good quality of education so necessary for productive life in modern society. But **education less than grade 9** is a person's first step in learning and knowledge building, so literacy figures (<9) are essential in any measurement of human development. This indicator measures the proportion of persons who are extremely disadvantaged in terms of education. Persons with little schooling or who have no certificate or degree are more likely to get low paying jobs that are fairly unrewarding. They are also more likely to

have episodes of unemployment or living on welfare. Epidemiological studies using education as a socioeconomic variable show that there are differences in health and welfare not only between the groups with the highest and lowest levels, but also across each level of schooling (Millar, 1993). Knowledge and skills acquired outside the traditional education system, for example through the media, libraries and recreational activities, are not taken into account by this measurement. The age structure may influence the value of this indicator. These two indicators reflect the levels of educational development.

Per capita expenditures on education reflect the priority afforded to education by the nation. It provides an indication of the extent of disparities in education within and between provinces. Spending on education is an indicator of the availability of educational resources. Amounts invested in education are intended to produce improvements in the educational, social and intellectual power of populations as well as improvements in the quality of life of society. Thus, it is assumed to be a crude measure of human development.

The indicator does not give us in complete information on the use of funds; we do not know what proportion of budgets is used to produce services, administer programs, finance research, etc. In the case of geographical comparisons, it should be noted that expenditures are attributed to the regions dispensing the service rather than to the region in which the beneficiary lives. The indicator is based on the assumption that each dollar spent produces an equivalent amount of services; in other words, that the effectiveness and return on each dollar is equal whatever the educational program, type of facility, region or characteristics of the population.

Health Dimension:

Health, as defined by the World Health Organization is a state of complete physical, mental and

social wellbeing, and not merely the absence of disease or infirmity. It is an important aspect of the quality of human life, which can be improved by the provision of efficient medical services. Environment is an important from the point of view of exposure and susceptibility to diseases. In other words, a low standard of living coupled with environmental factors such as poor housing, unsafe drinking water and lack of sewage disposal facilities enormously increase the risk of infections, diseases and mortality.

Expectation of life at birth is an accepted indicator of the level of mortality and the health situation of any population. In societies where there is no discrimination between the sexes, women, on average, survive for a longer period than men (Sinha, 1983). In Canada, a female baby born today can expect to live an average of 81 years and a male baby born today can expect to live an average of 75 years. The importance of life expectancy lies in the common belief that a long life is valuable in itself and in the fact that various indirect benefits such as adequate nutrition and wealth are closely associated with higher life expectancy.

An increase in life expectancy does not necessarily bring an increase in life expectancy in good health. When mortality decreases over time, the life expectancy obtained underestimates actual mean longevity. Life expectancies calculated for a given period do not reflect only the mortality for that period. They may be influenced by past conditions or by the traces left by past events (e.g. epidemic, war), which may cause a temporary increase in mortality at higher ages (Caselli, 1990). Regional disparities in life expectancy may vary with age. Geographical comparisons of life expectancy at age 65 may differ significantly from life expectancy at birth (Myers, 1989). In geographical comparisons, two regions may have the same life expectancy at birth and yet have widely varying age-specific rates (Brouard, 1990).

The **infant mortality rate** is an indicator of the level of mortality, health status and level of health care of a country/province. Differences in infant mortality from country to country may depend on

differences in the definition of live births and stillbirths (Nobile, 1990). Some experts feel that more than 10,000 births are needed in the denominator to obtain an accurate estimate of infant mortality (Van De Walle, 1990). These indicators are measures of mortality levels, respectively, over the entire span and in the first year of life (which is most sensitive to development levels).

The **suicide rate** reflects the mental health of a society. Suicide is a fatal injury deliberately inflicted on oneself with the intention of ending one's life (WHO, 1975). Death by suicide is an indicator of mental health and social breakdown (National Center for Health Statistics, 1993). In Canada, suicide is the leading cause of death in men 25-44 and the third-ranking cause of potential years of life lost in persons under 75. The indicator shows only the final consequence of the suicide phenomenon, since successful suicides represent only a small proportion of all attempted suicides. Attempted suicides are more common among females than among males, but more males commit suicide. Firearms and hanging were the main methods used in cases of suicide while intoxication by drugs, medication or poison are the means most often used in cases of attempted suicide (Birkhead, 1993). Consequently, it is a crude measure of human development, which reflects the low quality of mental health.

Social, cultural, forensic and religious factors may influence the reporting of suicide, resulting in an underestimation that can affect comparisons between provinces and over time (Lopez, 1990). The under estimation of deaths due to suicide is in the order of 18% for females and 12% for males. The majority of unidentified suicides fall into the category of undermined cause insofar as intention is concerned (Speechley, 1991).

Health expenditures include spending by federal, provincial and local governments, workers compensation boards and the private sector. The **per capita expenditures on health** reflect the priority afforded to the health sector by a given country. Amounts invested in health are intended to

produce improvements in the physical, social and emotional health of populations as well as improvements in the quality of life of patients and their families (Drummond, 1987). Per capita expenditures provide an indication of the extent of disparities in health resources between provinces.

The indicator does not take into account the characteristics of the population (e.g., distribution of the population by age), the characteristics of service providers (e.g. number of years of practice) or the characteristics of facilities. The indicator does not tell us whether or not the amounts spent are sufficient, whether the distribution of funds to the various programs and services is adequate or whether the services produced with these funds go to the “right” people (Evans, 1984).

The **number of beds per 1000 persons** (NBPP) is a measure of the availability of health care resources. The number of beds and places varies with the category of facility. The rated bed capacity is a maximum and may be higher than the number of beds approved due to budget limitations, major renovations or other factors. The production capacity of services linked to a bed or place depends on the size of the facility in which this bed or place is located. The indicator treats beds as being identical, which is not the case. The relative cost burden for each type of beds differs, and the needs of the individuals occupying each bed vary. Requirements in terms of number of beds may differ from one province to another, and with the characteristics of populations and health care professionals. The number of beds per 1000 persons (NBPP) and per capita health expenditures (PHE) are accepted indicators for the human development, which reflect the health care system of a Canadian community.

Economy

Economic growth is a very important condition for human development. The indicators of economic development (**average family income, average full year and full time income, and**

labor force participation rate) reflect the standard of living of provinces. These are the key components of economic development. The participation rate refers to the total labor force expressed as a percentage of the population 15 years of age and over, excluding institutional residents.

The **unemployment rate** in a region is the best single measure of job opportunities. The unemployment rate measures the proportion of persons who are more likely to have unfavorable living conditions and poor working conditions. The unemployment rate is higher in certain groups, notably young people, women and the poorly educated. Loss of a job generally brings a decrease in household income and a reduction in social activities (Jones, 1991). The unemployment rate is used as a negative indicator for human development.

This rate underestimates the true unemployment rate by about 1% to 2% since it does not take into account persons who have stopped actively looking for a job. Those unemployed according to the Statistics Canada definition are persons who offer their services on the job market, and the term is thus more related to job-seekers than to persons without jobs (Statistics Canada, 1993).

The **number of families of low income** (NFLINC) measures the population considered as poor. Along with education and occupation, income is one of the variables most often used as a socioeconomic indicator in studies analyzing the links between social condition and development. Studies show that there are health gradients in which differences are found not only between the groups with the highest and lowest income but also between all levels of the income scale (Wilkins, 1989). The groups most likely to be poor based on this definition are young people, elderly people living alone, young families, single-parent families, women and handicapped people.

This indicator considers only the economic dimension of the phenomenon since poverty is a phenomenon that also includes social and cultural aspects not taken into consideration by this

measurement. These two indicators are negatively related to the human development, which reflect a poor quality of standard of living. Thus, we accept seventeen indicators, which proxy for “human development”. It is important to classify the selected indicators into positive and negative ones, that is, those, which promote and those, which retard development.

Table A

<i>No</i>	<i>Description of variables</i>	<i>Abbreviation</i>
1	Reading skill level 1 (%)	RSL1
2.	Reading skill level 4 (%)	RSL4
3.	Numeracy skill level 1 (%)	NUSL1
4	Numeracy skill level 3 (%)	NUSL3
5.	Highest level of schooling in <grade9(%)	HLSL9
6.	Highest level of schooling in University(%)	HLSU
7.	Per capita expenditures on education(\$)	PEEDUC
8.	Expectation of life at birth	e0
9.	Infant mortality rate	IMR
10.	Number of beds per 1,000 population	NBPP
11.	Suicides per 100,000 population	S.R
12.	Per capita expenditures on health(\$)	PHE
13.	Average family income(\$)	AFINC
14.	Labor force participation rate (%)	P.R
15.	Unemployment rate (%)	UNEMP
16.	Number of families of low income to total population(%)	NFLINC
17.	Average full year and full time income (\$)	AFFINC

Methodology

The **taxonomic method**, which was designed by a group of Polish mathematicians in 1952, enables the determination of homogeneous units in an n-dimensional space without having to employ statistical tools such as regression and variance. It was recommended in 1968 to the United Nation’s Educational Scientific Cultural Organization (U.N.E.S.C.O) as a tool for ranking, classifying and comparing countries by levels of development. More recently, the method has been applied successfully to measure the levels of development of developing and developed countries.

We chose this method because it is suited for ranking, comparing and classifying regions of a country by levels of development, standard of living, status or any other such aspect. (For a detailed

description of the method, see Harbinson and others, 1970). Briefly stated, the steps involved in this method are given below:

Step1. The data of 'n' regions for 'm' variables is represented as a matrix of order n x m. X_{ij} , where $i=1,2,\dots,n$ and $j=1,2,\dots,m$.

$$\begin{bmatrix} X_{11} & X_{12} & \dots & X_{1m} \\ X_{21} & X_{22} & \dots & X_{2m} \\ \dots & \dots & \dots & \dots \\ X_{n1} & X_{n2} & \dots & X_{nm} \end{bmatrix}$$

Step 2. The elements of X_{ij} are standardized using the formula

$$\frac{(X_{ij} - \bar{X}_j)}{SD}$$

to give the standardized data matrix, $i=1,2,\dots,n$, $j=2,\dots,m$. The standardized value can be represented as

$$\begin{bmatrix} Z_{11} & Z_{12} & \dots & Z_{1m} \\ Z_{21} & Z_{22} & \dots & Z_{2m} \\ \dots & \dots & \dots & \dots \\ Z_{n1} & Z_{n2} & \dots & Z_{nm} \end{bmatrix}$$

(i) Distance Matrix: The elements of D_{ij} of the distance matrix are defined as

Where $D_{ii} = 0$ and $D_{ij} = D_{ji}$.

$$D_{ij} = \sqrt{\sum_{k=1}^m (Z_{ik} - Z_{jk})^2}$$

D_{ij} is the square root of the sum of squares of the elements of i th row to the corresponding elements of the j th row. The matrix is given by

$$\begin{bmatrix} 0 & D_{12} & D_{13} & \dots & D_{1n} \\ D_{21} & 0 & D_{23} & \dots & D_{2n} \\ \dots & \dots & \dots & \dots & \dots \\ D_{n1} & D_{n2} & D_{n3} & \dots & 0 \end{bmatrix}$$

In each row there will be one point with the shortest or minimum distance (C_i) at the corresponding point with row, that is

$$C_i = \min_j(D_{ij})$$

And $C_i \neq 0$.

(ii). The critical model distance (C.M.D) and critical value (C.V) are derived as follows:

$$C.V = C(-) = \bar{c} - 2s.d$$

$$C.M.D = C(+) = \bar{c} + 2s.d$$

Step 3.

The pattern of the development is obtained by following formula

$$C_{io} = \sqrt{\sum_{k=1}^m (Z_{ik} - Z_{ok})^2}$$

Where C_{io} denotes pattern of development ($i=1,2,\dots,n$) and Z_{ok} is the highest or the best-standardized value.

Step4.

The measure of development is given by $DI = C_{io}/C_o$

Where, $SD =$ Standard Deviation.

$$C_o = \overline{C_{ij}} + 2SD$$

$$\bar{C} = \sum_{i=1}^n \frac{C_{io}}{n}$$

The measurement of development is always non-negative & lies between 0 & 1. The closer the measure of development to “0”, the more developed is the region and the closer to “1”, the less developed is the region.

The above mathematical representation of the taxonomic method may be explained as follows.

Step1.

At the outset, selected indicators of development of provinces are arranged in a matrix form. It is important to classify the selected indicators into positive and negative ones, that is, those, which promote and those, which retard development.

Step2.

Since the taxonomic method, like many others, aims at constructing a unitary index of development, it is necessary to add up, at an appropriate stage, the value of all selected indicators. But since the original values of the different indicators are likely to be in different units, they cannot be pooled as such. For example, while reading skill is expressed as percentage, per-capita on education is expressed as dollars. It is, therefore, necessary to convert the original values of the indicator, into some standardized values. These standardized values of the selected indicators are arranged in another matrix.

The next step involved is to find out the 'distance' from each region to another region for each of the standardized values of the selected indicators. Thereafter, it is necessary to convert several distances of each region into one single mathematical expression so that it would be easy to compare all the regions. When the values thus obtained are arranged in a matrix form, we get a systematic distance matrix (Table 4.1, Table 5.1 and Table 6.1).

The first row in the distance matrix represents the composite distances between first region and every other region. In each row, there will be one region with the shortest or the minimum distances to the corresponding region. The former, region is called the primary 'model' of the later and the latter, the 'shadow' of the former. One can hypothesize a situation when in one row there may be two or more regions with the same shortest or the same minimum distance to corresponding region in that row. However, the probability of such situation arising is virtually zero. Therefore, one can assume that there

will always be only one region with shortest distance in each row (Table 4.2, Table 5.2, and Table 6.2).

Step 3 and 4.

The next step that follows in this process is to find out the “ pattern” and measure of development of each region. First, it is necessary to create an ideal region by taking highest or best standardized values of the indicators of the development of the groups under considerations. The simulated ideal region should obviously consist of the highest values of positive indicators and the lowest value of the negative indicators of the development of the group of regions under consideration. It is unlikely that only one region in the group will have the highest or lowest value of the indicators. Therefore, a model region is simulated from a group of regions.

The distances between ideal regions and every region in the matrix for each standardized value of selected indicators are calculated. These distances are then arranged in another matrix, from which we can find out the pattern and measurement of development of each region. The pattern of development is simply the composite distance from the ideal regions to other regions and the measure of development is a function of the pattern of development and critical distances from the simulated ideal region. These are derived by the formula discussed earlier.

In addition to facilitating the ranking of countries or regions by levels of development, the pattern and measure of development are useful in identifying countries, or regions which serve as the ‘model’ for the development of, and fixing a target for, a given country or region. Suppose we wish to find out ‘model’ regions for the development of, and fixing targets for, region ‘M’. The ‘model’ region for M should fulfill two conditions: its measures of development should be higher than that of M, and the distance between M and its model countries or regions should not exceed critical minimum distance (Step2 (ii), ref: Table 4.2, Table 5.2, and Table 6.2). When one of the model countries or regions is

identified, the arithmetic means of the original values of their indicators serve as one single model country or region for the development of, and fixing targets for, the country or region M.

FINDINGS AND DISCUSSION

Inter - provincial comparison of educational development

“The true education is not to give a man a standard of living, but a standard of life”
(Grattan O’ Leary)

Education has long been viewed as one of the keys to success in Canadian society - opening doors to jobs, earnings, and career and social development. With the complex division of labor of modern industrial societies, education has become a major social function. It is important, therefore, to examine the level of educational development in the human development process.

In the present study seven indicators of educational development are considered. Wide variations in the educational development indicators can be observed in table1. Since the taxonomic method, like many others, aims at constructing a unitary index of development, it is necessary to add up, at an appropriate stage, the value of all selected indicators. But since the original values of the different indicators are likely to be in different units, they cannot be pooled directly. It is therefore necessary to convert the original values of the indicators into some standardized values. These standardized values of the selected indicators are arranged in another matrix. Table 4 shows the standardized matrix of indicators for educational development by province. Wide differences in the standardized matrix of educational development indicators can be observed in Canada.

The pattern of development is simply the composite distance from the ideal region. Table 7 shows

the pattern and measure of educational development for all provinces in Canada. The “measure” of development is a function of the “pattern” and “critical distance” from the ideal region. It is non-negative and lies between 0 and 1. The closer the “measure” to “0”, the more developed is the region, and the closer to “1”, the less developed is the region.

From table 7, it is found that Alberta has the highest level of educational development followed by British Columbia, Manitoba, Saskatchewan, Ontario, Nova Scotia, Quebec, Prince Edward Island, New Brunswick and Newfoundland. Newfoundland has recorded the lowest educational development (EDI: 0.996). We can classify the provinces of Canada as follows: Mean – 2*Standard Deviation (most developed regions), Mean – Standard Deviation (more developed regions), Mean + Standard Deviation (less developed regions) and mean + 2* Standard Deviation (least developed regions).

- a. Most developed regions($0 < EDI < 0.24$): none
- b. More developed regions ($0.24 < EDI < 0.43$): Alberta and British Columbia.
- c. Less developed regions ($0.43 < EDI < 0.8$): Manitoba, Saskatchewan, Ontario, Nova Scotia, Quebec, PEI and New Brunswick.
- d. Least developed region ($0.8 < EDI < 1$): Newfoundland.

From the above results, it can be suggested that the classification is effective in identifying the levels of educational development. Suppose we wish to identify ‘model’ provinces and set potential targets for the educational development indicators for Quebec and Nova Scotia. The ‘model’ province for Quebec and Nova Scotia should be fulfil two conditions: (i) their measures of development should be higher than those of Quebec and Nova Scotia; and (ii) the distance between Quebec and Nova Scotia on the one hand and each of their respective model provinces on other should not be more than the C.M.D (Critical model (minimum) distance). If the distance between any region and every other region is longer

than critical minimum distance (C.M.D.) or shorter than critical value (C.V.) that region would not join any sub-group and is called atypical region (The computations of C.M.D and C.V. are explained in the methodology).

Table 7 shows the pattern and measure of development. We know six provinces meet the first criterion to be the models for Quebec and five provinces for Nova Scotia. From Table 4.1 we know their distances from Quebec and Nova Scotia.

Table 1.1
Provinces meeting the first criterion to be models for Quebec and Nova Scotia

(C.M.D=3.639, ref: table 4.2)

1. Quebec	Measure of educational development	Distance from Quebec
Alberta	0.303	4.36
British Columbia	0.411	4.052
Manitoba	0.481	2.145
Saskatchewan	0.508	3.732
Ontario	0.61	3.772
Nova Scotia	0.664	2.348
Quebec	0.679	0.00
2. Nova Scotia	Measure of educational development	Distance from Nova Scotia
Alberta	0.303	3.782
British Columbia	0.411	3.052
Manitoba	0.481	1.95
Saskatchewan	0.508	3.3
Ontario	0.61	4.096
Nova Scotia	0.664	0.00

SOURCE: Derived from Table 4.1 & Table 7.

The provinces which meet the first criterion to be the models for Quebec and Nova Scotia, their measures of educational development, and their distances from Quebec and Nova Scotia are shown in Table 1.1. Of the six provinces, which meet the first criterion to be the models for Quebec, four provinces, viz., British Columbia, Alberta, Saskatchewan and Ontario do not meet the second criterion. The distance between Quebec and British Columbia is 4.052, between Quebec and Alberta is 4.36, between Quebec and Saskatchewan is 3.732 and that between Quebec and Ontario is 3.772 respectively, which are more than the C.M.D (3.639). Thus, Quebec has two provinces on

which to model such as Manitoba and Nova Scotia.

Of the five provinces which meet the first criterion to be the models for Nova Scotia, two provinces, viz., Alberta and Ontario do not meet the second criterion because their distances from Nova Scotia are 3.782 and 4.096 respectively, which exceed the C.M.D. Thus three provinces serve as models for Nova Scotia. The potential targets for the educational development indicators for Quebec and Nova Scotia are the arithmetic means of the values of the particular indicators for their respective model provinces.

Table 1.2

Potential targets for the educational development Indicators for Quebec and Nova Scotia

1. For Quebec	Reading Skill level1 (RSL1) %	Reading Skill level4 (RSL4) %	Numeracy Skill level1 (NUSL1) %	Numeracy Skill level3 (NUSL3) %	Highest Level of Schooling Less than grade9 (HLSL9) %	Highest Level Of Schooling University (HLSU) %	Per capita Expenditures on education (PEEDUC) \$
Manitoba	5	65	13	61	15.2	10.2	1871
Nova Scotia	5	57	21	56	13.6	10.4	1713
Mean(target)	5	61.00	17	58.5	14.4	10.3	1792
Current level (Quebec)	6	57	19	54	20.6	10.3 well developed	1929 well developed
2. For Nova Scotia	Reading Skill level1 (RSL1) %	Reading Skill level4 (RSL4) %	Numeracy Skill level1 (NUSL1) %	Numeracy Skill level3 (NUSL3) %	Highest Level of Schooling Less than grade9 (HLSL9) %	Highest Level Of Schooling University (HLSU) %	Per capita Expenditures on education (PEEDUC) \$
B.C.	5	69	9	69	9.1	11.2	1811
Manitoba	5	65	13	61	15.2	10.2	1871
Saskatchewan	3	72	9	66	16.3	8.6	1797
mean(target)	4.33	68.67	10.33	65.33	13.53	10	1826
Current level	5	57	21	56	13.6	10.4	1713

(Nova Scotia)						(well developed)	
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Source: Table 1

As shown in Table 1.2, the potential targets for RSL4 (Reading skill level 4) and NUSL3 (Numeracy skill level 3) for Quebec are 61% and 58.5% respectively, as against the current rates of 57% and 54%; and those for Nova Scotia are 68.67% and 65.33% as against the current rates of 56% and 54%. Also, the result shows the potential targets for other educational development indicators for Quebec and Manitoba. The arithmetic means of the values of indicators for the model should serve as potential targets. A given point (value of indicator) does not necessarily mean that the arithmetic means of the values of all the indicators for the model points always higher than the values of all the indicators for a given point. We know that RSL1 (Reading skill 1), NUSL1 (Numeracy skill 1) and HLSL9 (Highest level of schooling <9) are negative for educational development.

Table 1.1 reveals that the potential targets for these indicators are less than the current levels. Sometimes it happens that the value of a particular indicator of a given point will be equal or even higher than, the arithmetic mean of the values of the indicators for the model points. This is not the weakness of the taxonomic method, but rather its strength. The method only shows that the particular indicator is relatively well developed and not much attention is necessary in the immediate future to improve it further. With such knowledge, a planner can trade off the scarce resources to improve other indicators in the group. The point may be illustrated with an example. Suppose we wish to fix potential targets for HLSU (Highest level of schooling university) for Nova Scotia. The model provinces of Nova Scotia are British Columbia, Manitoba and Saskatchewan, and the arithmetic mean of their HLSU (highest level of schooling university) is 10 points which is less than Nova Scotia's current HLSU (highest level of

schooling university) of 10.4 points. From these results, it is assumed that the educational development indicator, HLSU (highest level of schooling university), for Nova Scotia is better developed than other educational development indicators.

It is admitted and also understandable that the taxonomic method is ineffective in identifying the model points and fixing potential targets for the points at the top of the measures of educational development. For example, we cannot find the model provinces and fix targets for Alberta; there is no province with a higher measure of educational development than Alberta. So it is not advisable to fix potential targets on the basis of only one model province. The correlation analysis (appendix3) ³ reveals that all educational indicators are highly correlated with EDI (Educational development index) except RSL1 (Reading skill level1). It clearly shows that RSL4 (reading skill level 4) is a fairly reliable indicator of educational development in different provinces of Canada.

Educational goals may be expressed in a variety of different ways. Sometimes they are expressed in terms of required output by level and type of education; sometimes they focus on a particular education; sometimes they are expressed in the form of a general policy statement. As stated in UNESCO document, these educational goals, in whatever form they are expressed, must be converted into enrollment targets for each relevant level and type of education. Obviously, the planner must respect the internal consistency and the structural balance of the educational system.

The rapidly increasing expenditures on education for Quebec have been associated with enormous increases in student enrollments and sharp increases in the proportion of eligible children attending school. The results show that quality of education is high in Canada. Education occupies a highly important place in human development process. This method must be an integral component of all educational planning for setting targets in allocating scarce resources.

Inter - provincial comparison of health development

Table 2 shows five health development indicators in real terms for ten provinces of Canada. Of the five selected indicators, Infant Mortality Rates and Suicide Rates are assumed to be negative or deterrents for health development and others are assumed to be positive or promoters of health development. Table 5 shows the standardized values of the indicators.

Table 8 shows the pattern and measure of development by province. Ontario has the highest level of health development and Quebec has the lowest level of health development in Canada, respectively. We can classify the provinces of Canada as follows:

- a. Most developed regions ($0 < \text{HEDI} < 0.35$): none
- b. More developed regions ($0.35 < \text{HEDI} < 0.51$): Ontario, Manitoba,
and British Columbia.
- c. Less developed regions ($0.51 < \text{HEDI} < 0.84$): New Brunswick, Alberta, Saskatchewan,
and Nova Scotia
- d. Least developed region ($0.84 < \text{HEDI} < 1$): PEI, Newfoundland, and Quebec.

The taxonomic method is a very useful tool in identifying provinces on which to 'model' in setting potential targets for a given province. The following example illustrates the method. Suppose we want to identify 'model' provinces for Newfoundland and Quebec. It may be recalled that the 'model' should meet two criteria: (1) The measure of development should be higher than those of Newfoundland and Quebec, and (2) the distances of each of their respective model provinces should not be more than the critical minimum distance. Table 8 shows the pattern and measures of health development in Canada. We know that eight provinces meet the first criterion to be models for Newfoundland and nine provinces for Quebec respectively. From Table 5.1 we know their distances from Newfoundland and

Quebec.

Table 1.3
Provinces meeting the first criterion to be models for Newfoundland and Quebec
 (C.M.D=2.983, ref: table 5.2)

1. For Quebec	Measure of health development	Distance from Quebec
Ontario	0.469	3.836
Manitoba	0.489	3.717
British Columbia	0.498	3.852
New Brunswick	0.565	3.042
Alberta	0.652	1.866
Saskatchewan	0.659	3.507
Nova Scotia	0.75	2.792
PEI	0.876	5.974
Newfoundland	0.895	4.369
Quebec	0.896	0.00
2. For Newfoundland	Measure of health development	Distance from Newfoundland
Ontario	0.469	3.943
Manitoba	0.489	3.126
British Columbia	0.498	4.333
New Brunswick	0.565	2.869
Alberta	0.652	3.85
Saskatchewan	0.659	3.628
Nova Scotia	0.75	2.145
PEI	0.876	3.845
Newfoundland	0.895	0.00

Source: Derived from Table 5.1 & Table 8

The measures of development and their distances from Quebec and Newfoundland are shown in Table 1.3. The nine provinces meet the first criterion to be the models for Quebec. The two provinces Alberta and Nova Scotia meet the second criterion. The distance between Quebec and Alberta is 1.866 and that between Quebec and Nova Scotia is 2.792, both of which are less than the critical minimum distance, (2.983). Thus, Quebec has two provinces on which to model. Of the eight provinces which meet the first criterion to be the models for Newfoundland, two provinces, viz., New Brunswick and Nova Scotia meet the second criterion; their distances from Newfoundland are 2.869 and 2.145 respectively, which is less than critical minimum distance. Thus, 2 provinces serve as models for Newfoundland.

Table 1.4

Potential targets for the health development indicators for Quebec and Newfoundland.

1. For Quebec	Expectation Of life at birth (e0)	Infant mortality Rates (IMR)	Number of beds per 1,000 population (NBPP)	Suicides per 100,000 population (S.R)	Per capita Expenditures On Health (PHE) \$
Alberta	78.6	6.65	16.2	16.3	2400
Nova Scotia	77.9	7.09	16.2	12	2231
mean(target)	78.25	6.87	16.2	14.15	2316
Current level (Quebec)	78.4 (well developed)	5.73 (well developed)	13.7	19.4	2263
2.For Newfoundland	Expectation Of life at birth (e0)	Infant mortality Rates (IMR)	Number of beds per 1,000 population (NBPP)	Suicides per 100,000 population (S.R)	Per capita Expenditures On Health (PHE) \$
New Brunswick	78.2	7.18	17.8	12.1	2389
Nova Scotia	77.9	7.09	16.2	12	2231
mean(target)	78.05	7.14	17	12.05	2310
Current level (Newfoundland)	77.6	7.79	12.8	6.6 (well developed)	2259

Source: Table 2

Table 1.4 reveals that the potential targets for the suicide rate for Quebec is 16.3 per 100,000 population as against the current rate of 19.4 per 100,000 population. Similarly, the potential target for the infant mortality rate for Newfoundland is 7.14 as against the current rate 7.79. The potential targets for the infant mortality rate for Quebec and the suicide rate for Newfoundland are 6.87 and 12.05 respectively, which are higher than current rates. From these results, it is clear that the indicators of IMR and exp. (0) for Quebec and SR for Newfoundland are relatively well developed and not much attention is necessary in the immediate future for these health indicators. With such findings, the researcher can trade off the scarce resources to improve other health indicators in the study.

The correlation analysis (appendix 3)³ reveals that the indicator PHE (per-capita health expenditures) is more closely related to the index than other specific indicators. Provision of adequate health care is of vital importance to the welfare of the population of Canada. The level of health development is lower in Quebec than in other provinces due to the suicide record. There are many theories about the motivations for suicide. Suicide results from a person's reaction to a perceived overwhelming problem, such as social isolation, death of a loved one (especially a spouse), a broken home in childhood, serious physical illness, growing old, unemployment, financial problems, and drug abuse (Clayman, 1989). The health indicator S.R (suicides rate) has played a significant role in retarding the health development process in Quebec.

One of the saddest facts of Canadian life is the health gap that separates rich and poor. The reasons for the gap are not fully understood, but they appear to be due in large part to the debilitating conditions of life that poverty forces upon people. One of the more promising approaches to improving the health of Canadians is "health public policy". The government should consider the health consequences of all their policies.

Inter - provincial comparison of economic development

It has been a continuous endeavor of economists and planners to measure and compare the levels of development in different regions of the economy in order to know where a given region stands in relation to others ? What has been achieved in the past ? Which dimension of development needs more attention in future ? And what goals and targets are to be set?

Canada stands at the higher end of development as compared to other countries, but the disparities

³ Appendix3: "negative sign for HDI, HEDI, EDI, ECDI"=> POSITIVE CORRELATION, HIGEST DI IS THE LOWEST DEVELOPMENT.

are exceedingly large among its different provinces. In the present analysis, five indicators of economic development are taken into account: average family income (AFINC), participation rate (P.R), unemployment rate (UNEMP), number of families of low income to total population (NFLINC), and average full year and full time income (AFFINC). Table 3 shows that there exists a wide difference among the provinces of Canada in terms of economic development indicators.

The pattern of economic development is simply the composite distance from the ideal region. Table 9 shows the pattern and measure of economic development of Canada by province. The closer the “measure” to “0”, the more developed is the region, and the closer to “1”, the less developed is the region. Table 9 reveals that Ontario is in first position in economic development followed by Alberta, B.C, Saskatchewan, P.E.I, Quebec, Nova Scotia, Manitoba, New Brunswick and Newfoundland. So we can classify the provinces as follows by using mean-2SD (most developed), mean-SD (more developed), mean + SD (less developed) and mean+2SD (least developed).

- a. most developed($0 < \text{ECDI} < 0.088$): none
- b. more developed($0.088 < \text{ECDI} < 0.32$): Ontario, Alberta, and BC
- c. Less developed ($0.32 < \text{ECDI} < 0.77$): Saskatchewan, P.E.I, Quebec, Nova Scotia, Manitoba, and New Brunswick.
- d. Least developed ($0.77 < \text{ECDI} < 1$): Newfoundland.

From Table 9, it is found that Ontario has the highest level of economic development. Newfoundland has recorded the lowest level of economic development (ECDI: 0.937). The planners have had the tools to fix different targets for different provinces. This study is a very useful tool in identifying provinces on which to ‘model’ in setting potential targets for a given province. Let us identify ‘model’ provinces and set potential targets for the economic development indicators for Nova Scotia

and Manitoba. We know that the ‘model’ should meet two criteria: (1) Their measures of development should be higher than those of Nova Scotia and Manitoba, and (2) The distance between each of their respective model provinces should not be more than the critical minimum distance.

Table 9 shows the pattern and measures of economic development. We know that six provinces meet the first criterion to be the models for Nova Scotia and that of seven provinces for Manitoba, respectively. And from table 6.1 we know their distances from Manitoba and Nova Scotia.

Table 1.5
Provinces meeting the first criterion to be models for Manitoba and Nova Scotia
(C.M.D=2.751, ref: table 6.2)

1. For Manitoba	Measure of economic development	Distance from Manitoba
Ontario	0.174	4.231
Alberta	0.221	3.271
British Columbia	0.282	3.744
Saskatchewan	0.617	1.62
PEI	0.62	2.819
Quebec	0.621	1.34
Nova Scotia	0.639	2.201
Manitoba	0.646	0.00
2. For Nova Scotia	Measure of economic development	Distance from Nova Scotia
Ontario	0.174	3.827
Alberta	0.221	3.745
British Columbia	0.282	2.918
Saskatchewan	0.617	2.116
PEI	0.62	2.110
Quebec	0.621	1.754
Nova Scotia	0.639	0.00

Source: Derived from Table 6.1 & Table 9

The provinces, which meet the first criterion to be the models for Manitoba and Nova Scotia, their measures of economic development and distances from Manitoba and Nova Scotia are shown in Table 1.5. Of the seven provinces which meet the first criterion to be the models for Manitoba, four provinces, viz., Ontario, Alberta, B.C and PEI do not meet the second criterion, which are more than the C.M.D, 2.751. Thus, Manitoba has three provinces on which to model. Similarly, the three provinces: Saskatchewan, PEI and Quebec meet the first and second criterion to be the models for

Nova Scotia.

Table 1.6.

Potential targets for the economic development indicators

<u>1.FOR Manitoba</u>	Average family income (AFINC) \$	Labor force Participation Rate (P.R) %	Unemployment Rate (UNEMP) %	Number of families of Low income to total population (NFLINC) %	Average full year and full time income (AFFINC) \$
Saskatchewan	45930	68.5	7.1	3.49	27868
Quebec	48634	65.1	12.1	4.24	31705
Nova Scotia	45130	63.3	12.7	3.41	30841
mean(target)	46565	65.63	10.63	3.71	30138
current level (Manitoba)	46621 (well developed)	67.6 (well developed)	8.1 (well developed)	4.27	29607
<u>2. For Nova Scotia</u>	Average family income (AFINC) \$	Labor force Participation Rate (P.R) %	Unemployment Rate (UNEMP) %	Number of families of Low income to total population (NFLINC) %	Average full year and full time income (AFFINC) \$
Saskatchewan	45930	68.5	7.1	3.49	27868
PEI	42779	69.1	13.5	2.9	28617
Quebec	48634	65.1	12.1	4.24	31705
mean(target)	45781	67.57	10.9	3.55	29397
current level (Nova Scotia)	45130	63.3	12.7	3.41 (well developed)	30841 (well developed)

Source: Table 3

The potential targets for the economic development indicators for Manitoba and Nova Scotia are the arithmetic means of the values of particular economic development indicators for their respective model provinces. As shown in Table 1.6 the potential targets for NFLINC (number of families of low income) and AFFINC (average full year and full time income) for Manitoba are 3.27 percent and \$30138 respectively as against the current of 4.27 percent and \$29607. The results reveal that the economic indicators such as AFINC (average family income), P.R (participation rate) and UNEMP (unemployment rate) for Manitoba are better-developed indicators in the group. With such knowledge, researchers can trade off the limited resources to improve other economic indicators such as NFLINC

(number of families of low income) and AFFINC (average full year and full time income) for Manitoba in the group. We know that UNEMP (unemployment rate) and NFLINC (number of families of low income) are assumed to be negative for the economic development.

Similarly, we can measure the potential targets for the economic development indicators for Nova Scotia. Table 1.6 shows that the economic development indicators such as NFLINC (number of families of low income) and AFFINC (average full year and full time income) for Nova Scotia are better developed. The correlation analysis in appendix 3 reveals that all indicators of economic development are highly correlated with ECDI (economic development index). With such a finding, a researcher can trade off the scarce resources to improve other economic indicators in the study.

It is observed that more people are unemployed in Newfoundland than Ontario. Regional disparities in unemployment rates are more serious now. But regional differences in participation rates are mainly voluntary. Society helps some provinces more than others through the various programs for reducing regional disparities. From the policy point of view, removing unemployment disparities is an urgent priority

Inter province comparison of the human development

In 1990, the UNDP defined human development as the process of increasing people's options. It stressed that the most critical choices that people should have include the options to lead a long and healthy life, to be knowledgeable and to have access to the assets, employment and income needed for a decent standard of living. The report proposed a new measure of development, the human development index, composed of three indicators: life expectancy, education and income. In this study the human development index is composed of 17 indicators, which reflect the development dimensions

of education, economy and health. Table 10 reveals that the differences among indices are quite wide. These indices are the different dimensions of the human development process.

Table 11 shows the pattern and measure of human development in Canada. Our human development index consists of three indices: health development index (HEDI), educational development index (EDI) and economic development index (EDI). According to the levels of human development, we can classify the provinces of Canada as follows:

- a. most developed ($0 < \text{HDI} < 0.008$): none
- b. more developed ($0.008 < \text{HDI} < 0.256$): BC and Alberta
- c. Less developed ($0.256 < \text{HDI} < 0.752$): Ontario, Manitoba, Saskatchewan, Nova Scotia, New Brunswick, Quebec and PEI.
- d. Least developed ($0.752 < \text{HDI} < 1$): Newfoundland.

Provinces like B.C and Newfoundland probably conform to the common sense estimates that the former is at the top of human development in Canada and the latter at the bottom. These results depend on the selected variables and quality of data used. The correlation analysis reveals that the index of education is best developed than other development indices. The result shows that the human development index is highly correlated with other indices of development.

Table 12 shows the development ranking of the provinces based on the indices of education, economy, health and human development. The result reveals that in two (Newfoundland and Nova Scotia) out of the 10 provinces, the ranks of the human development and that of educational development are the same; however, it is of particular importance here to note that they are all at the lower level. Newfoundland is at the lowest rank for economy, health as well as human development. Provinces with the same ranks for both health and economic development are Nova Scotia and

Ontario. Provinces, which rank low in development index and high in levels of human development, are British Columbia and Alberta.

Regional disparities play a vital role in human development process. There are significant natural and social barriers separating one region from another. Education plays a highly important place in economic and social development. It is observed that the development of the health sector has strong impact on human development process. With such findings, planners can trade off the scarce resources to improve the health sector.

CONCLUSION

The achievements in meeting basic needs differ significantly by province. Provinces are having different positions for the levels of health, education, economy as well as human development. The result reveals that British Columbia has the highest levels and Newfoundland has the lowest levels on the human development index. Inter-province analysis suggests that the levels of human development within the country are not satisfactory. Human development planning is essentially an effort to focus on the key problems. The solutions proceed via policies and plans, but in the end, through projects and programs. Human development planning can be viewed as a typical subset of economic planning in general, different from but overlapping with counter-cyclical planning, regional planning, and manpower planning.

We have made a quantitative analysis of human development in different provinces in Canada with the help of the taxonomic method. The method has proved to be useful in ranking, classifying and comparing the provinces on various human development dimensions. Also, this method has identified the relatively well-developed and underdeveloped indicators within the group of indicators of development

in each province, in setting initial targets and in allocating resources.

The number of indicators selected for the quantitative analysis of human development is admittedly inadequate. But it is doubtful whether the picture of human development in different provinces would alter significantly if more indicators were added. The taxonomic method does not place any limit on the number of indicators to be selected and used. This study is a useful tool in identifying indicators or spatial imbalances in development with the view of setting up targets in allocating the scarce resources.

We have seen that 'development' cannot be easily defined and measured. Although, the results of analysis largely depend on the selection of variables and quality of data used, it emerges on the basis of different development indices that the level of human development, particularly for the quality of health is not satisfactory. It is gratifying that the urgent need for solution for reduction of disparities among human beings. Canada leads the way towards human development.

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APPENDIX 1

(Tables)

Table 1
Educational Indicators by Province

Province	Reading Skill level1 (RSL1) %	Reading Skill level4 (RSL4) %	Numeracy Skill level1 (NUSL1) %	Numeracy Skill level3 (NUSL3) %	Highest Level of Schooling less than grade9 (HLSL9) %	Highest Level of Schooling University (HLSU) %	Per capita Expenditures on education (PEEDUC) \$
	1989	1989	1989	1989	1991	1991	1993-94
Newfoundland	7	39	29	45	20.8	6.6	2223
PEI	5.5	56.5	21.5	55	15.7	8.5	1677
Nova Scotia	5	57	21	56	13.6	10.4	1713
New Brunswick	6	56	22	54	20.1	8.4	1822
Quebec	6	57	19	54	20.6	10.3	1929
Ontario	9	62	11	64	11.9	13	2004
Manitoba	5	65	13	61	15.2	10.2	1871
Saskatchewan	3	72	9	66	16.3	8.6	1797
Alberta	5	71	8	72	9.1	11.9	1943
British Columbia	5	69	9	69	9.1	11.2	1811

Sources:

1. Adult Literacy in Canada: Results of a National Study, Catalogue 89-525E, Statistics Canada.
2. Educational Attainment and School Attendance, Catalogue 93-328, Statistics Canada.
3. Canada Year Book 1997.

Table 2
Health Indicators by Province

Province	Expectation Of life at birth (e0) 1996	Infant mortality Rates (IMR) 1993	Number of beds per 1,000 population (NBPP) 1991-92	Suicides per 100,000 population (S.R) 1996	per	Per capita Expenditures On Health (PHE) \$ (1994)
Newfoundland	77.6	7.79	12.8	6.6		2259
PEI	77.2	9.12	22.3	8.6		2299
Nova Scotia	77.9	7.09	16.2	12		2231
New Brunswick	78.2	7.18	17.8	12.1		2389
Quebec	78.4	5.73	13.7	19.4		2263
Ontario	78.8	6.24	14.9	9.4		2614
Manitoba	78.1	7.06	17.5	10.6		2546
Saskatchewan	78.3	8.06	19.6	14.4		2352
Alberta	78.6	6.65	16.2	16.3		2400
British Columbia	78.9	5.74	14.3	9.7		2631

Sources:

1. Canada Year Book 1997.
2. The Daily, April 16, 1998, Statistics Canada, Catalogue 11-001E

Table 3
Economic Indicators by province

Province	Average family income (AFINC) \$ 1991	Labor force Participation Rate (P.R) % 1991	Unemployment Rate (UNEMP) % 1991	Number of families of Low income to total population (NFLINC) % 1986 base	Average full year and full time income (AFFINC) \$ (1990)
Newfoundland	41654	61.3	27.8	4.25	30993
PEI	42779	69.1	13.5	2.9	28617
Nova Scotia	45130	63.3	12.7	3.41	30841
New Brunswick	44323	62.9	15.4	3.3	30274
Quebec	48634	65.1	12.1	4.24	31705
Ontario	58634	69.6	8.5	2.89	36031
Manitoba	46621	67.6	8.1	4.27	29607
Saskatchewan	45930	68.5	7.1	3.49	27868
Alberta	55552	74	7.8	3.36	33325
British Columbia	54895	67.6	10.3	2.8	34886

Sources:

1. Canada year book 1994.
2. Labor force activity, The Nation, Statistics Canada, Catalogue 93-324.
3. Selected income statistics, Statistics Canada, Catalogue 93-331

Table 4
Standardized Educational Indicators by Province

Province	Reading Skill level 1 (RSL1) %	Reading Skill level 4 (RSL4) %	Numeracy Skill level 1 (NUSL1) %	Numeracy Skill level 3 (NUSL3) %	Highest of Schooling less than grade 9 (HLSL9) %	Highest Level of Schooling University (HLSU) %	Per capita of Expenditures On education (PEEDUC) \$
Newfoundland	0.9097	-2.313	1.87051	-1.86263	1.333506	-1.83	2.3008
PEI	-0.101	-0.426	0.77021	-0.58686	0.110326	-0.78	-1.35
Nova Scotia	-0.438	-0.372	0.69686	-0.45928	-0.39334	0.271	-1.11
New Brunswick	0.2358	-0.48	0.84356	-0.71443	1.165618	-0.84	-0.384
Quebec	0.2358	-0.372	0.40344	-0.71443	1.285538	0.216	0.3346
Ontario	2.2573	0.1671	-0.7702	0.561341	-0.80106	1.712	0.8387
Manitoba	-0.438	0.4906	-0.4768	0.178609	-0.00959	0.161	-0.055
Saskatchewan	-1.786	1.2453	-1.0636	0.816497	0.25423	-0.73	-0.547
Alberta	-0.438	1.1375	-1.2103	1.581962	-1.47261	1.102	0.4256
B.C	-0.438	0.9219	-1.0636	1.199229	-1.47261	0.715	-0.453

Table 4.1.
Distance from each province to every other province (Education)

	NFL	PEI	NSC	NB	QUE	ONT	MANI	SAS	ALB	B.C
NFL		4.833	5.289	3.795	3.970	6.331	5.538	6.799	7.421	7.226
PEI	4.833		1.248	1.482	2.342	4.629	2.383	3.410	4.517	3.745
NSC	5.289	1.248		2.177	2.348	4.096	1.950	3.300	3.782	3.052
NB	3.795	1.482	2.177		1.356	4.536	2.534	3.730	4.892	4.369
QUE	3.970	2.342	2.348	1.356		3.772	2.145	3.732	4.360	4.052
ONT	6.331	4.629	4.096	4.536	3.772		3.380	5.160	3.230	3.382
MANI	5.538	2.383	1.950	2.534	2.145	3.380		2.058	2.487	2.045
SAS	6.799	3.410	3.300	3.730	3.732	5.160	2.058		3.116	2.671
ALB	7.421	4.517	3.782	4.892	4.360	3.230	2.487	3.116		1.070
B.C	7.226	3.745	3.052	4.369	4.052	3.382	2.045	2.671	1.070	

Table 4.2.
Minimum distance from each province to every other province (Education)

Province	Minimum distance(Ci)
Newfoundland	3.795
PEI	1.248
Nova Scotia	1.248
New Brunswick	1.356
Quebec	1.356
Ontario	3.23
Manitoba	1.95
Saskatchewan	2.058
Alberta	1.070
British Columbia	1.070
CMD	3.639

Table 5

Standardized Health Indicators by Province

Province	Expectation of life at birth (e0)	Infant mortality Rates (IMR)	Number of beds Per 1,000 Population (NBPP)	Suicides per 100,000 population (S.R)	per	Per capita Expenditures On Health (PHE) \$
Newfoundland	-1.19523	0.719	-1.3616	-1.45237636		-0.985007
PEI	-1.99205	2.039	2.10633	-0.90534195		-0.702365
Nova Scotia	-0.59761	0.024	-0.1205	0.024616548		-1.182856
New Brunswick	0	0.113	0.46361	0.051968269		-0.066421
Quebec	0.39841	-1.33	-1.0331	2.048643868		-0.956743
Ontario	1.195229	-0.82	-0.595	-0.68652819		1.5234394
Manitoba	-0.1992	-0.01	0.3541	-0.35830754		1.0429483
Saskatchewan	0.199205	0.987	1.1207	0.681057841		-0.327865
Alberta	0.796819	-0.41	-0.1205	1.200740532		0.0113057

B.C	1.394433	-1.32	-0.8141	-0.60447302	1.6435622
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Table 5.1.
Distance from each province to every other province (Health)

	Newfoundland	PEI	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	B.C
NFL	.00	3.845	2.145	2.869	4.369	3.943	3.126	3.628	3.850	4.333
PEI	3.845	.00	3.473	3.420	5.974	5.535	3.717	3.088	4.868	6.071
NSC	2.145	3.473	.00	1.398	2.792	3.461	2.342	2.065	2.224	3.825
NB	2.869	3.420	1.398	.00	3.042	2.548	1.210	1.303	1.606	2.996
QUE	4.369	5.974	2.792	3.042	.00	3.836	3.717	3.507	1.866	3.852
ONT	3.943	5.535	3.461	2.548	3.836	.00	1.961	3.535	2.529	.596
MANI	3.126	3.717	2.342	1.210	3.717	1.961	.00	2.166	2.209	2.458
SAS	3.628	3.088	2.065	1.303	3.507	3.535	2.166	.00	2.060	4.002
ALB	3.850	4.868	2.224	1.606	1.866	2.529	2.209	2.060	.00	2.753
B.C	4.333	6.071	3.825	2.996	3.852	.596	2.458	4.002	2.753	.00

Table 5.2.
Minimum distance from each province to every other province (Health)

Province	Minimum distance(Ci)
Newfoundland	2.145
PEI	3.088
Nova Scotia	1.398
New Brunswick	1.210
Quebec	1.866
Ontario	0.596
Manitoba	1.210
Saskatchewan	1.303
Alberta	1.606
British Columbia	0.596
CMD	2.983

Table 6

Standardized Economic Indicators by Province

Province	Average family income (AFINC) \$	Labor force Participation Rate (P.R) %	Unemployment Rate (UNEMP) %	Number of families of low income to total population (NFLINC) %	Average full year and full time Income (AFFINC) \$
Newfoundland	-1.2108	-1.56	2.67336	1.387568556	-0.168578
PEI	-1.0094	0.611	0.20219	-1.08043876	-1.118402
Nova Scotia	-0.5883	-1	0.06394	-0.14808044	-0.229341
New Brunswick	-0.7329	-1.11	0.53053	-0.34917733	-0.456004
Quebec	0.03919	-0.5	-0.0397	1.36928702	0.1160496
Ontario	1.83002	0.75	-0.6619	-1.09872029	1.8454011
Manitoba	-0.3213	0.194	-0.731	1.424131627	-0.722642
Saskatchewan	-0.4451	0.444	-0.9038	-0.00182815	-1.41782
Alberta	1.27809	1.972	-0.7828	-0.23948812	0.763657

B.C	1.16043	0.194	-0.3508	-1.26325411	1.3876786
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Table 6.1.
Distance from each province to every other province (Economic)

	NFL	PEI	NSC	NB	QUE	ONT	MANI	SAS	ALB	B.C
NFL		4.223	3.141	2.849	3.181	5.994	3.969	4.569	5.839	5.223
PEI	4.223		2.110	2.030	3.149	4.197	2.819	1.680	3.508	3.391
NSC	3.141	2.110		.585	1.754	3.827	2.201	2.116	3.745	2.918
NB	2.849	2.030	.585		2.139	4.161	2.585	2.367	4.095	3.209
QUE	3.181	3.149	1.754	2.139		3.773	1.340	2.471	3.347	3.222
ONT	5.994	4.197	3.827	4.161	3.773		4.231	4.145	1.929	1.044
MANI	3.969	2.819	2.201	2.585	1.340	4.231		1.620	3.271	3.744
SAS	4.569	1.680	2.116	2.367	2.471	4.145	1.620		3.183	3.522
ALB	5.839	3.508	3.745	4.095	3.347	1.929	3.271	3.183		2.190
B.C	5.223	3.391	2.918	3.209	3.222	1.044	3.744	3.522	2.190	

Table 6.2.
Minimum distance from each province to every other province (Economic)

Province	Minimum distance(Ci)
Newfoundland	2.849
PEI	1.680
Nova Scotia	0.585
New Brunswick	0.585
Quebec	1.340
Ontario	1.044
Manitoba	1.340
Saskatchewan	1.620
Alberta	1.929
British Columbia	1.044
CMD	2.751

Table 7
Pattern and Measure of Educational Development by Province

Province	Pattern(Cio)	Measure(EDI)	Characteristics of the Province	Rank
Newfoundland	7.600953	0.996	Least developed	10
PEI	5.800313	0.76	Less developed	8
Nova Scotia	5.071933	0.664	Less developed	6
New Brunswick	5.870732	0.769	Less developed	9
Quebec	5.180591	0.679	Less developed	7
Ontario	4.659436	0.61	Less developed	5
Manitoba	3.669101	0.481	Less developed	3
Saskatchewan	3.87917	0.508	Less developed	4
Alberta	2.309621	0.303	More developed	1
British Columbia	3.135485	0.411	More developed	2

Table 8
Pattern and Measure of Health Development by Province

Province	Pattern(Cio)	Measure(HEDI)	Characteristics of the province	Rank
Newfoundland	5.461333	0.895	Least developed	9
PEI	5.347961	0.876	Least developed	8
Nova Scotia	4.573894	0.75	Less developed	7
New Brunswick	3.450054	0.565	Less developed	4
Quebec	5.465047	0.896	Least developed	10
Ontario	2.862587	0.469	More developed	1
Manitoba	2.985238	0.489	More developed	2
Saskatchewan	4.023722	0.659	Less developed	6
Alberta	3.981646	0.652	Less developed	5
British Columbia	3.041005	0.498	More developed	3

Table 9
Pattern and Measure of Economic Development by Province

Province	Pattern	Measure(ECDI)	Characteristics of Province	Rank
Newfoundland	6.750343	0.937	Least developed	10
PEI	4.467084	0.62	Less developed	5
Nova Scotia	4.600485	0.639	Less developed	7
New Brunswick	4.925604	0.684	Less developed	9
Quebec	4.470414	0.621	Less developed	6
Ontario	1.25657	0.174	More developed	1
Manitoba	4.651291	0.646	Less developed	8
Saskatchewan	4.444006	0.617	Less developed	4
Alberta	1.592964	0.221	More developed	2
British Columbia	2.030562	0.282	More developed	3

Table 10

Indices of provinces on the basis of different dimensions (Health, Economy & Education) of development

Province	HEDI	ECDI	EDI
Newfoundland	0.894945	0.937	0.99566
PEI	0.876367	0.62	0.75979
Nova Scotia	0.749521	0.639	0.66438
New Brunswick	0.565358	0.684	0.76902
Quebec	0.895553	0.621	0.67861
Ontario	0.46909	0.174	0.61035
Manitoba	0.489189	0.646	0.48062
Saskatchewan	0.659364	0.617	0.50814
Alberta	0.652469	0.221	0.30254
B.C	0.498327	0.282	0.41072

Table 11

Pattern and Measure of Human Development by Province

Provinces	Pattern	Measure (HDI)	Characteristics of Province	Rank
Newfoundland	5.58791	0.995	Least developed	10
PEI	3.97919	0.708	Less developed	9
Nova Scotia	3.27295	0.583	Less developed	6
New Brunswick	3.36237	0.598	Less developed	7
Quebec	3.82016	0.68	Less developed	8
Ontario	1.61148	0.287	Less developed	3
Manitoba	2.2708	0.404	Less developed	4
Saskatchewan	2.50919	0.447	Less developed	5
Alberta	1.14699	0.204	More developed	2
British Columbia	0.75843	0.135	More developed	1

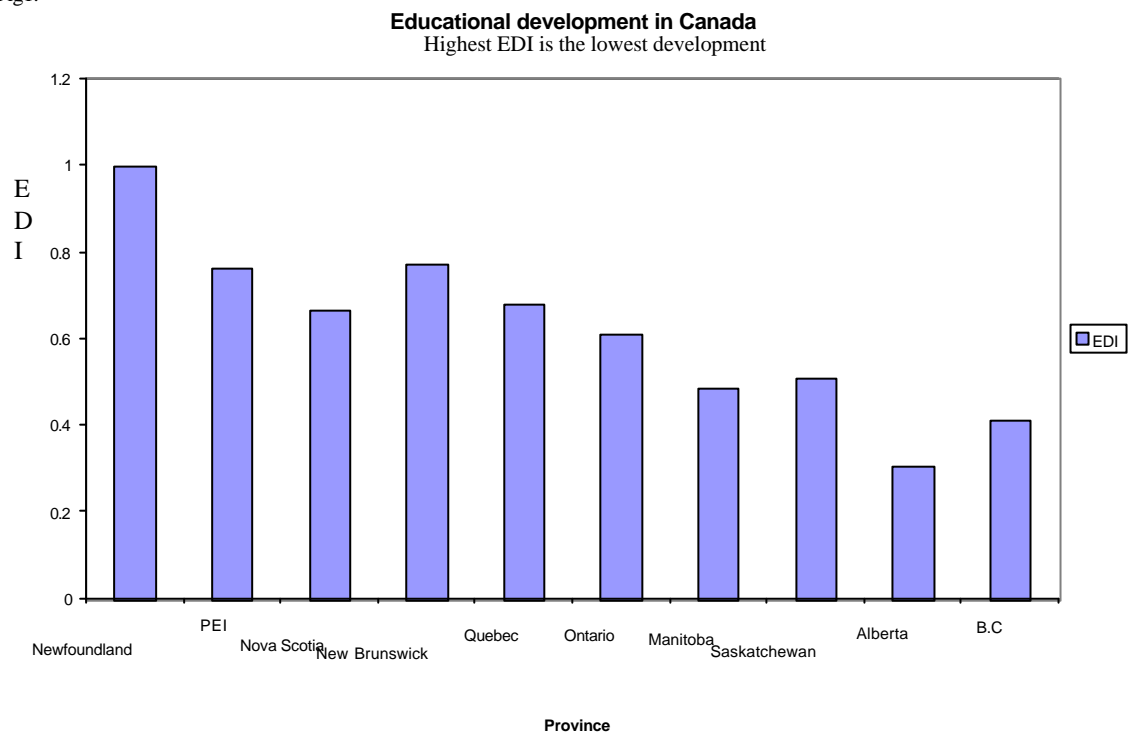
Table 12

Ranks of Provinces on the basis of Education, Health, Economic and Human Indices

Province	Human Development Rank(HDI)	Educational development Rank(EDI)	Health Development Rank(HEDI)	Economic Development Rank(ECDI)
Newfoundland	10 (least)	10 (least)	9 (least)	10 (least)
PEI	9 (less)	8 (less)	8 (least)	5 (less)
Nova Scotia	6 (less)	6 (less)	7 (less)	7 (less)
New Brunswick	7 (less)	9 (less)	4 (less)	9 (less)
Quebec	8 (less)	7 (less)	10 (least)	6 (less)
Ontario	3 (less)	5 (less)	1 (more)	1 (more)
Manitoba	4 (less)	3 (less)	2 (more)	8 (less)
Saskatchewan	5 (less)	4 (less)	6 (less)	4 (less)
Alberta	2 (more)	1 (more)	5 (less)	2 (more)
British Columbia	1 (more)	2 (more)	3 (more)	3 (more)

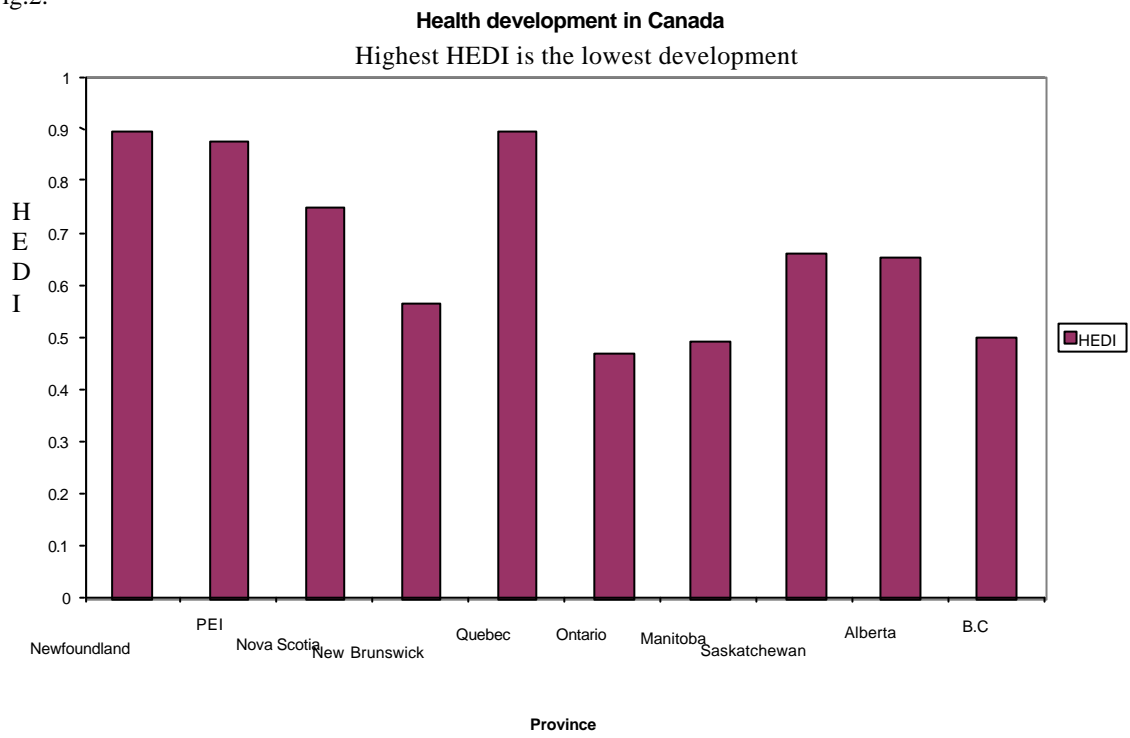
APPENDIX 2
(Charts)

Fig1.



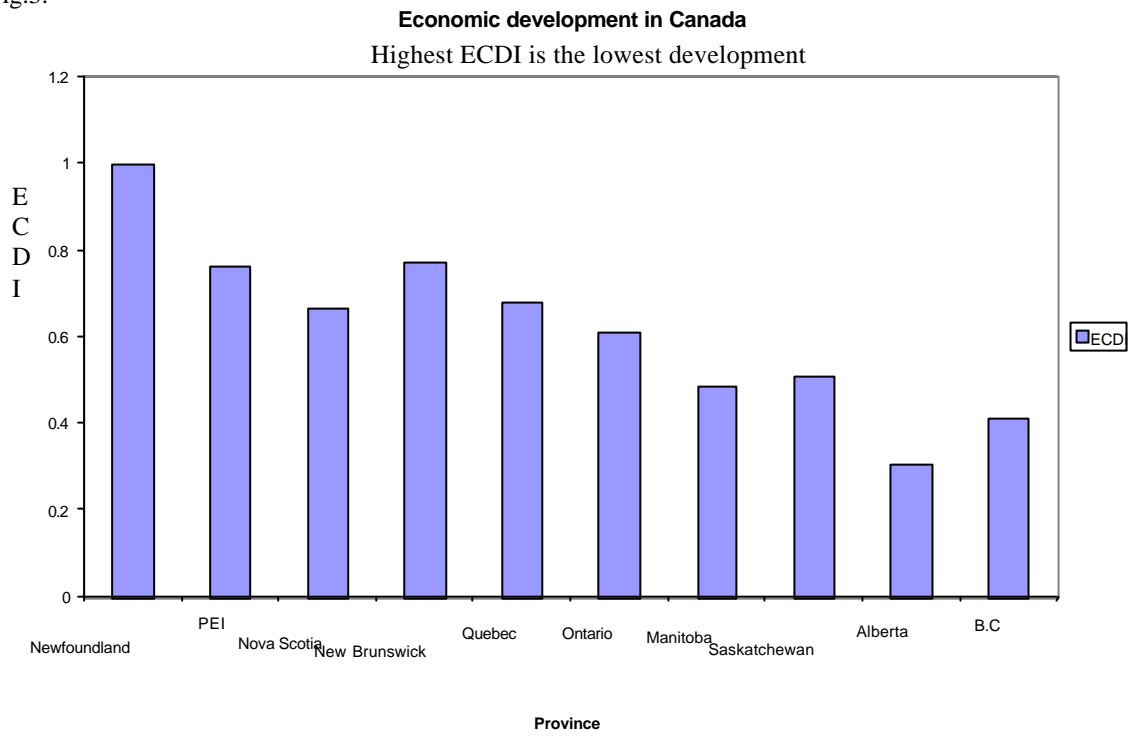
Reference: Table7

Fig.2.



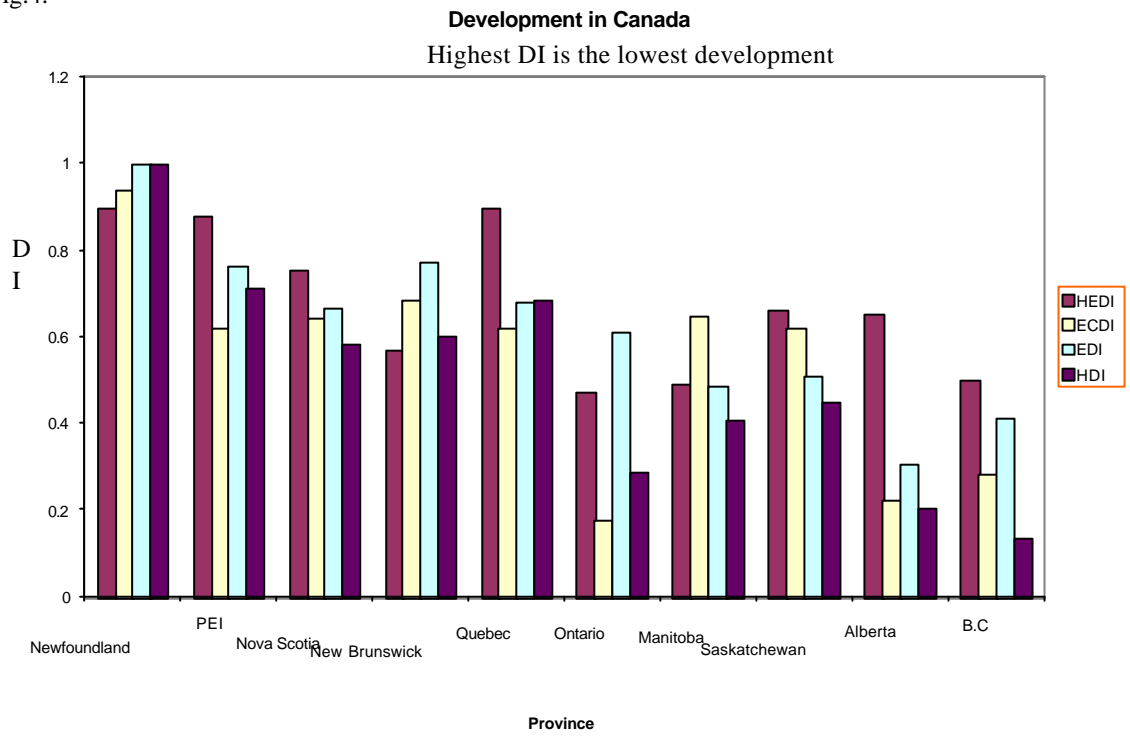
Reference: Table 8

Fig.3.



Reference: Table9

Fig.4.



Reference: Table10.

APPENDIX 3

Definitions

Reading level1: Canadians at this level have difficulty dealing with printed materials. They most likely identify themselves as people who cannot read.

Reading level4: Canadians at this level meet most everyday reading demands. This is a diverse group, which exhibits a wide range of skills.

Numeracy level1: Canadians at this level have very limited numeracy abilities which them to, at most, locate and recognize numbers in isolation or in a short text.

Numeracy level3: Canadian at this level can deal with material requiring them to perform simple sequences of numerical operations, which enable them to meet most everyday demands

Sources of data

The following secondary sources of data are used:

1. Adult literacy in Canada: results of a National Study, Catalogue 89-525E.
2. Educational attainment and school attendance, Catalogue 93-328, The Nation, 91 Census, Statistics Canada.
3. Labor force activity, The Nation, Catalogue 93-324, Statistics Canada.
4. Selected income statistics, Catalogue 93-331, Statistics Canada.
5. Canada Year Book 1994, Statistics Canada.
6. Canada Year Book 1997, Statistics Canada.
7. The Daily, April 16, 1998, Catalogue 11-001E, Statistics Canada; Catalogue 93-310, 91 Census,

Correlations

		EDI	HLSL9	NUSL1	NUSL3	PEEDUC	RSL1	RSL4	HLSL9
Pearson Correlation	EDI	1.000	.788**	.938**	-.956**	.319	.433	-.943**	-.710*
	HLSL9	.788**	1.000	.751**	-.846**	.257	.098	-.688*	-.757**
	NUSL1	.938**	.751**	1.000	-.972**	.223	.298	-.951**	-.718**
	NUSL3	-.956**	-.846**	-.972**	1.000	-.281	-.326	.944**	.719**
	PEEDUC	.319	.257	.223	-.281	1.000	.561*	-.478	-.111
	RSL1	.433	.098	.298	-.326	.561*	1.000	-.506	.244
	RSL4	-.943**	-.688*	-.951**	.944**	-.478	-.506	1.000	.617*
	HLSL9	-.710*	-.757**	-.718**	.719**	-.111	.244	.617*	1.000
Sig. (1-tailed)	EDI	.	.003	.000	.000	.184	.106	.000	.011
	HLSL9	.003	.	.006	.001	.237	.393	.014	.006
	NUSL1	.000	.006	.	.000	.268	.202	.000	.010
	NUSL3	.000	.001	.000	.	.216	.179	.000	.010
	PEEDUC	.184	.237	.268	.216	.	.046	.081	.380
	RSL1	.106	.393	.202	.179	.046	.	.068	.249
	RSL4	.000	.014	.000	.000	.081	.068	.	.029
	HLSL9	.011	.006	.010	.010	.380	.249	.029	.
N	EDI	10	10	10	10	10	10	10	10
	HLSL9	10	10	10	10	10	10	10	10
	NUSL1	10	10	10	10	10	10	10	10
	NUSL3	10	10	10	10	10	10	10	10
	PEEDUC	10	10	10	10	10	10	10	10
	RSL1	10	10	10	10	10	10	10	10
	RSL4	10	10	10	10	10	10	10	10
	HLSL9	10	10	10	10	10	10	10	10

** . Correlation is significant at the 0.01 level (1-tailed).

* . Correlation is significant at the 0.05 level (1-tailed).

Correlations

		E0	HEDI	IMR	NBPP	PHE	S.R
Pearson Correlation	E0	1.000	-.675*	-.841**	-.470	.675*	.384
	HEDI	-.675*	1.000	.406	.013	-.888**	.138
	IMR	-.841**	.406	1.000	.745**	-.465	-.406
	NBPP	-.470	.013	.745**	1.000	-.128	-.063
	PHE	.675*	-.888**	-.465	-.128	1.000	-.255
	S.R	.384	.138	-.406	-.063	-.255	1.000
Sig. (1-tailed)	E0	.	.016	.001	.085	.016	.137
	HEDI	.016	.	.122	.486	.000	.352
	IMR	.001	.122	.	.007	.088	.122
	NBPP	.085	.486	.007	.	.362	.431
	PHE	.016	.000	.088	.362	.	.239
	S.R	.137	.352	.122	.431	.239	.
N	E0	10	10	10	10	10	10
	HEDI	10	10	10	10	10	10
	IMR	10	10	10	10	10	10
	NBPP	10	10	10	10	10	10
	PHE	10	10	10	10	10	10
	S.R	10	10	10	10	10	10

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

Correlations

		AFFINC	AFINC	ECDI	NFLINC	P.R	UNEMP
Pearson Correlation	AFFINC	1.000	.863**	-.744**	-.366	.265	-.143
	AFINC	.863**	1.000	-.950**	-.443	.651*	-.585*
	ECDI	-.744**	-.950**	1.000	.642*	-.775**	.698*
	NFLINC	-.366	-.443	.642*	1.000	-.423	.356
	P.R	.265	.651*	-.775**	-.423	1.000	-.732**
	UNEMP	-.143	-.585*	.698*	.356	-.732**	1.000
Sig. (1-tailed)	AFFINC	.	.001	.007	.149	.230	.346
	AFINC	.001	.	.000	.100	.021	.038
	ECDI	.007	.000	.	.023	.004	.012
	NFLINC	.149	.100	.023	.	.111	.156
	P.R	.230	.021	.004	.111	.	.008
	UNEMP	.346	.038	.012	.156	.008	.
N	AFFINC	10	10	10	10	10	10
	AFINC	10	10	10	10	10	10
	ECDI	10	10	10	10	10	10
	NFLINC	10	10	10	10	10	10
	P.R	10	10	10	10	10	10
	UNEMP	10	10	10	10	10	10

** . Correlation is significant at the 0.01 level (1-tailed).

* . Correlation is significant at the 0.05 level (1-tailed).

Correlations

		ECDI	EDI	HDI	HEDI
Pearson Correlation	ECDI	1.000	.749**	.888**	.594*
	EDI	.749**	1.000	.920**	.594*
	HDI	.888**	.920**	1.000	.793**
	HEDI	.594*	.594*	.793**	1.000
Sig. (1-tailed)	ECDI	.	.006	.000	.035
	EDI	.006	.	.000	.035
	HDI	.000	.000	.	.003
	HEDI	.035	.035	.003	.
N	ECDI	10	10	10	10
	EDI	10	10	10	10
	HDI	10	10	10	10
	HEDI	10	10	10	10

** . Correlation is significant at the 0.01 level (1-tailed).

* . Correlation is significant at the 0.05 level (1-tailed).