CONSTRUCTION OF HUMAN DEVELOPMENT INDICES USING
MULTIVARIATE TECHNIQUES

By

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Abstract

UNDP started the exercise of comparing the level of human development between its member countries since 1990 based on the human development index (HDI). Four variables namely, Life expectancy, Adult literacy rate, Gross enrolment ratio and Adjusted GDP are used in computing the HDI value in respect of each country. Though the process appears to be a simple and effective exercise, given the four variables, an alternative study was felt desirable in order to put the construction of the index in proper perspective. First the method of weighted Principal Component approach was applied to the same four variables as used in the HDI. A subsequent analysis was performed on an extended number of variables to strengthen the arguments made in favour of the technique used. It was also intended to shed light on the peculiar problems that are faced by the developing nations through the outcome of the research work. Distribution of income, specially for the poorest of the poor, and the food security/nutrition are very important aspects which determine the actual human development of a country. In this respect this study estimated a composite index of human development (CIHD) based on three factors, namely, 'Aggregate development', 'Income disparity' and 'Food and nutrition supply'. The model has been estimated using weighted principal component based factor analysis, a modified multivariate technique. The weighting of the variables with the reciprocal of the eigen value of the first Principal Component of each of the group (the set) is the key to the new method. The weighted factor analysis will even out the effect of the different number of variables chosen to represent the respective set. There is scope for extending the identified method to any number of variables and any number of sets.

The composite index constructed based on this technique can be used to rank any country which can be assumed to conform to the correlation structure of the selected variables. It was, however, discovered that the correlation structure of the international data does not agree very much with the intra-national level data, thus limiting the application of the constructed indices into local conditions. Disagreement can be attributed to the limitations of data compilation methods that have been adopted by the official agencies who are responsible for the data gathering. Infant Mortality rate and Gross enrolment ratio can be cited as two examples where the above mentioned problems are encountered. Only 44 countries in the developing world were taken for the study due to data limitations on crucially important variables such as the Gini coefficient and per capita indices of food production and calorie supply. Interesting results can be found in the analysis with Egypt ranking first, based on CIHD, followed by China, Algeria, Indonesia, Tunisia, Vietnam, Malaysia etc. in the list of selected 44 nations. The countries have also been clustered on the type and amount of development based on the respective Means and Standard Deviations of factor scores according to the three factors in the model.