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Verification and Sanctions

Reliable verification²⁰ is of crucial importance for the acceptance of Joint Implementation. The more intensive the verification, the higher a project's transaction costs. Every project must be subjected to independent verification. The length of verification intervals depends on the duration of the project. A national evaluation authority should carry out spot checks in order to monitor the reports of the independent verification organisations. The precise framework and implementation of national verification concepts is a matter for individual countries. Agreement on a set of international verification standards would be a good thing.

²⁰ For verification issues see Katscher et al., op. cit.

Sanctions must be imposed on the project participants if the planned emission reductions are not achieved. In the case of private projects, concessions can be correspondingly cut. Breaches of contract between private enterprises could be punished according to the rules of international civil law. A "Red List" containing all known deliberate "Joint Implementation contract breakers" could act as a deterrent. In the case of prolonged or deliberate infringements of contract, the guilty parties should be excluded, either temporarily or permanently, from the Joint Implementation system; this would be registered in the "Red List". The Conference of the Parties should establish a dispute settlement procedure for bilateral or multilateral disputes along the lines of the new GATT dispute settlement mechanism.

DEVELOPMENT INDICATORS

Irmgard Nübler*

The Human Development Index Revisited

The emergence of the Human Development Index has stimulated wide-ranging debate about its usefulness and ability to measure human development adequately.¹ This article discusses whether the HDI should be rejected in view of the criticism it has attracted, or improved, refined and more widely used.

Since 1990 the United Nations Development Programme (UNDP) has published an annual Human Development Report, in the same way as the World Bank publishes a World Development Report. Both reports include a ranking of all countries according to their "level of development". Whereas the World Development Report uses per capita income as the indicator for development, the UNDP has devised a new indicator, the human development index (HDI). Direct comparison of the two country rankings shows substantial differences for a number of countries. The HDI therefore calls into question the use of per capita income as the dominant development indicator.

Human Development and the HDI

The UNDP considers human development as a very broad concept that places human beings at the centre of development as the "real end of all activities".²

Human development is defined as a process of enlarging people's choices and relates to economic, political, social and cultural fields. The concept is universally applicable to both developing and industrial countries.³

Human development is an abstract variable that cannot be observed, and hence cannot be measured directly. Consequently, the UNDP developed a measurement concept to portray the abstract variable. In general, a measurement concept consists of three conceptual levels:

- an abstract variable, which is the ultimate criterion of interest but which is not observable and hence cannot be measured directly;

¹ See H. Trabold-Nübler: The Human Development Index – A New Development Indicator?, in: INTERECONOMICS, Vol. 26, 1991, No. 5, pp. 236-243; G. Luchters and L. Menkhoff: The Fourth Première of the Human Development Index, in: INTERECONOMICS, Vol. 30, 1995, No. 1, pp. 9-15.

² UNDP: Human Development Report 1990, New York 1990, p. 9.

³ UNDP, op. cit., p. 11.

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Table 1
The Measurement Concept of the HDI¹

Abstract variable:	Human development			
Dimensions:	Longevity	Knowledge	Decent standard of living	
Indicators:	Life expectancy at birth	Literacy	Average years of schooling	Real per capita income

¹ According to the latest version of the HDI published in the Human Development Report 1994.

□ dimensions to define the abstract variable; they index the degree of success achieved in terms of the abstract variable, but are not directly observable;

□ empirical variables that can be observed and quantified. These become indicators for the abstract variable to be measured if a theoretical relationship is formulated via the dimensions.

In order to measure the abstract variable of "human development", the HDI uses four empirical variables that are allotted different weights in the index: Life expectancy at birth (1/3), literacy rate (2/9), average number of years of schooling (1/9) and real per capita income (1/3). The various measurement variables are rendered comparable by transforming the observed country values for each variable to a scale ranging from 0 to 1. In the 1994 HDI the variables life expectancy, literacy and average years of schooling are converted linearly. Real per capita income, however, is converted linearly up to \$5,120 and logarithmically above that level.⁴ The four scaled values are then weighted and added together to form the HDI. The HDI values therefore also lie between 0 and 1, and the higher a country scores the higher its human development is considered to be.

The first part of this article examines the extent to which this measurement concept is actually capable of measuring the abstract variable of human development. If the validity of measurements cannot be guaranteed, the HDI in its present form must be rejected. Consequently, discussion of the validity and assessment of the HDI must be accompanied by

consideration of whether and to what extent methodological shortcomings can be eliminated by modifying or extending the index.

Basis of the Measurement Concept

One shortcoming of the HDI lies in the inadequate theoretical and empirical basis of its design. The concept of human development is described in terms of economic, political, social and cultural dimensions, but the HDI relates only to social and economic dimensions, namely a long and healthy life, knowledge and a decent standard of living. No convincing reasons are given for choosing these dimensions and ignoring others, such as political and social freedom or respect for human rights. Furthermore, the choice of the individual indicators on the basis of their ability to index the degree of success in terms of the dimensions is open to challenge. However, alternative indicators often cannot be used because of poor data availability; for example, the UNDP would have preferred the "nutrition status of children under age 5" as their ideal health indicator, but data were not available. Over the long term, this shortcoming could be eliminated by improving the data, and the use of a set of indicators to measure one particular dimension could help resolve conceptual problems.⁵

The weighting as well as the choice of the dimensions and indicators is based essentially on implicit assumptions and value judgements. Ideally, the weights should be determined by reference to a welfare function showing the contribution of each dimension to overall social well-being. Such a function is not known, so that whatever weighting is chosen it will be arbitrary to some extent. Nevertheless, the UNDP should at least explain why it opted for nominal equal weighting of the three dimensions.

The choice of the various transformation functions is also open to criticism. No justification is given for the decision to convert the individual indicators of life expectancy, literacy and average number of years of schooling on a linear basis. In fact, it is reasonable to assume that education displays declining marginal utility, and indeed studies for different regions show falling social rates of return from education investment as the level of education rises.⁶ This suggests transformation of the variable average number of years of schooling on a progressive scale.

The non-linear, non-continuous transformation of per capita income above \$5,120 is justified on the grounds of the declining marginal utility of income.

⁴ \$ 5,120 is the current average global value of real GDP per capita in purchasing power parity dollars.

⁵ This approach will be discussed in greater detail from the point of view of the validity of the approach.

⁶ G. Psacharopoulos: Returns to Education: An International Comparison, Amsterdam 1973.

However, it is not explained why income below \$5,120 is transformed in a linear manner and therefore ignores the idea of declining marginal utility. Nor can the very high discounting of income above \$5,120 be justified either theoretically or empirically. While it is possible to justify a relatively high discounting rate for the use of income for consumption, the same cannot be said of the use of income for investment. Income invested in physical and human capital increases the potential for future human development. The progressive discounting of income can be justified on the grounds of the empirical recognition of the declining marginal utility of consumption⁷ and the declining social rates of return on investment in human capital as the level of human capital rises.⁸

The above reflections demonstrate that the HDI is based on a series of implicit assumptions and value judgements which are neither justified adequately nor supported by empirical findings.

Validity of the Concept

Measurements can be considered reliable if the validity of the measurement concept is guaranteed. This is achieved by selecting relevant empirical measurement variables and by capturing all the dimensions as fully as possible.

The relevance of the indicators applied in the HDI can be questioned. The extent to which the dimension long and healthy life is achieved is measured by the indicator life expectancy at birth. This in turn is calculated from mortality statistics, and is therefore of only limited value as an indicator of health, illness and disability during life. A more relevant variable would be the so-called DALY,⁹ which measures years of life adjusted for illness.

Furthermore, the weighting of the two education indicators implies that literacy is the more relevant variable for human development. This weighting must be seriously questioned. Schooling implies a formal learning process. The ability to read and write is one result of this process, alongside a host of other cognitive and non-cognitive effects that contribute to human development.¹⁰ Studies have shown that infant mortality is negatively related to years of schooling, but not to the adult literacy rate. Hence, years of schooling is a critical variable in human development. Consequently, the validity of the concept could be improved by giving a far higher weighting to years of schooling than to the literacy rate.

Apart from the relevance of the indicators, a measurement concept must be comprehensive in order to be valid. The HDI measures human

development only incompletely, as it confines itself to only two social and one economic dimension and ignores the cultural and political dimensions. The UNDP even acknowledges this: "the concept of human development is much broader than its measurement".¹¹ Despite the admission that "human development is incomplete without human freedom",¹² no attempt is made to include this dimension in the measurement concept. If political freedom and respect for human rights are not taken into consideration, however, essential aspects of human development are ignored. In these circumstances, the validity of the concept is no longer assured.

Despite ignoring some dimensions, the concept could nevertheless be valid if there were a high positive correlation between the variables used and those that are disregarded. A study of the 46 poorest countries by Partha Dasgupta¹³ shows, however, that there is a significant negative relationship between the literacy rate and the degree of political freedom and civil rights.¹⁴ For the group of poorest countries, at least, the HDI therefore tends to overestimate human development in countries with a relatively high literacy rate.

By publishing a Human Freedom Index,¹⁵ the UNDP has already indicated an interesting way of taking account of the human freedom dimension. This should be pursued further in order to improve validity.

As there are no comprehensive or direct indicators, a single indicator can hardly measure completely a given dimension. The validity of the concept is increased by using a set of indicators which serve to supplement and control each other.¹⁶ The HDI

⁷ M. Lipton: *Assessing Economic Performance*, London 1968.

⁸ G. Psacharopoulos: *Education and Development. A Review*, in: *The World Bank Research Observer*, Vol. 3, 1988, No. 1.

⁹ World Bank: *World Development Report 1993*, Washington, D.C., 1993.

¹⁰ C. Colclough: *The Impact of Primary Schooling on Economic Development: A Review of the Evidence*, in: *World Development*, Vol. 10, 1982, No. 3.

¹¹ UNDP: *Human Development Report 1991*, New York 1991, p. 15.

¹² UNDP: *Human Development Report 1990*, p. 16.

¹³ P. Dasgupta: *Well-Being in Poor Countries*, in: *Economic and Political Weekly*, 4 August 1990, pp. 1713-20.

¹⁴ Dasgupta draws the conclusion that „regimes which had bad records in political and civil rights were associated with good performance in the field of adult literacy. I have no explanation for this which is compelling to me.“

¹⁵ UNDP, *op. cit.*, 1991, p. 18.

¹⁶ A. Critto: *Methodological Aspects in the Study of Social Indicators*, in: *Labour and Society*, International Institute for Labour Studies, Vol. 4, 1979, No. 4, pp. 331-354.

measures the dimensions "long and healthy life" and "a decent standard of living" with only one indicator in each case, and even the dimension "knowledge" is measured very incompletely by the two indicators used. In every society one generation passes knowledge and information to the next. In this way country-specific education and training modes have developed by which general knowledge and vocational skills are passed on via both formal and informal channels. The educational indicators used by the UNDP relate primarily to knowledge acquired in the formal school system and ignore the transfer of knowledge by other means. For example, in many countries occupational knowledge is transferred mainly through apprenticeships in craft and industrial enterprises. Moreover, in developing countries a vast amount of knowledge and skills is passed on through traditional apprenticeships or in private "backstreet colleges".¹⁷

The HDI therefore ignores a substantial part of human development in societies in which knowledge is passed on mainly outside the formal school system. This shortcoming could be eliminated by considering additional indicators based on vocational and informal training, which would help produce a broad measurement of the knowledge dimension in its various manifestations.

Sensitivity and Ability to Differentiate

Finally, the measurements acquire validity if indicators are used that react sensitively to changes in the abstract variable and are able to differentiate sufficiently between countries at different levels of development.

As far as possible, changes in a country's human development should be reflected fully and without delay in the HDI. Some of the indicators do not meet this requirement. The average number of years of schooling is a stock variable that relates only to the population aged more than 25 years. Hence, the HDI reflects an increase in the level of human development for the rising generation only after a lag of up to 20 years. The use of another age group or flow variables, such as the school enrolment ratio, would improve the sensitivity of the HDI and indicate current human development without a long delay.

Another desirable indicator characteristic is the ability to differentiate, a characteristic that the literacy and per capita income indicators do not adequately display. A person with simple reading and writing abilities is classified as literate. The threshold is therefore very low, and differences in the level of

reading and writing ability are not taken into account. Overall, 80% of all countries are in the upper third of the HDI ranking with scaled indicator values of between 0.93 and 1. The literacy rate therefore has a limited ability to differentiate.¹⁸

Furthermore, the non-linear conversion of per capita income means that income above the current average global per capita income is so heavily discounted that there is very little differentiation; as a result, the scaled indicator values for one-third of all countries are between 0.95 and 1. The ability to differentiate would be improved by choosing a lower discounting rate, as suggested above on conceptual grounds.

Analysis of the measurement concept shows that in its present form the HDI does not ensure the validity of the measurements owing to a series of methodological and conceptual shortcomings. At the same time, however, there is obviously room for improvement in respect of methodology. Indeed, the UNDP does not regard the HDI as an immutable index; a number of substantial improvements in the measurement concept have already been made, such as the establishment of inter-period comparability. The modifications made in recent years are therefore to be seen not as inconsistency but as part of the process of developing the HDI concept.

HDI versus Per Capita Income

Any development indicator should be assessed in the light of the alternatives available. As regards the HDI measurement concept, it should be borne in mind that all development indicators used hitherto also display a series of conceptual, methodological and technical flaws.¹⁹ The most frequently used indicator, per capita income, is particularly affected in this way; first, it is based on a development concept that has proved a failure in many countries, for economic growth has not generated the expected trickle down effect and development, and secondly per capita income even measures economic development

¹⁷ I. Nübler: The Knowledge Dimension in the Human Development Index: In Search of a Broader Concept, background paper prepared for the Human Development Report 1993, UNDP, New York 1992.

¹⁸ DIW Economic Bulletin: UN Overestimates the Level of Development in Central and Eastern Europe, Vol. 30, 1993, No. 6, pp. 9-13.

¹⁹ See for example H.-R. Hemmer: *Wirtschaftsprobleme der Entwicklungsländer*, Munich 1988, pp. 8-21; D. Nohlen and F. Nuscheler: *Indikatoren von Unterentwicklung und Entwicklung. Probleme der Messung und quantifizierende Analyse*, in: D. Nohlen and F. Nuscheler (eds.): *Handbuch der Dritten Welt*, Vol. 1, Hamburg 1992, p. 82; N. Hicks and P. Streeten: *Indicators of Development: The Search for a Basic Yardstick*, in: *World Development*, Vol. 7, 1979, pp. 567-580.

imperfectly, as it relates solely to growth and ignores structural change. Moreover, per capita income is not a value-free indicator, and its design entails a series of assumptions and value judgements. For example, market prices are used to determine the weights for output; market prices do not, however, always reflect true scarcity but are determined partly by power positions on the supply and demand sides and by income distribution within the country.

Furthermore, there are many shortcomings in the method of measurement. For example, intermediate inputs produced by private households or final products produced in the subsistence economy or in the informal sector are disregarded, and both positive and negative external effects in the production of goods and services are ignored. As regards demographic aspects, there is the problem of different age structures as well as serious statistical problems in the measurement of population. For example, only the economically active population contributes to national product; the smaller this group in relation to the total population, the higher its average labour productivity must be in order to reach a particular per capita income. As there is a close positive correlation between the level of development and labour productivity, ignoring the age structure when interpreting per capita income as a development indicator can produce unsatisfactory results. Summarising one can say that the conceptual and methodological problems of social and human indicators appear to be no greater than those associated with per capita income, "we have just grown accustomed to ignoring the latter".²⁰

Nevertheless, per capita income is not unimportant, as it shows the extent to which economic growth kept pace with population growth. In view of its conceptual and methodological flaws, and especially its normative role in development policy,²¹ it should not, however, be used as the dominant indicator of development.

Multiple Functions of Development Indicators

The HDI should be assessed not only in terms of the quality of its measurement methods but also in the light of the purpose it serves. Development indicators may perform informative, normative, evaluatory and decision-making functions.

First, a development indicator may be used to describe living conditions in a country. This information can be interpreted for the analysis and diagnosis of development conditions and needs. Used in cross-country comparisons, it gives an insight

into a country's relative level of development. "Obviously, indicators do not tell everything. ... Instead, ... they provide an 'at a glance' profile of current conditions".²²

The HDI can perform its informative function only if the measurement concept is adequate. The measurements have to obtain a high degree of validity in order to present a reliable picture of a country's development situation. The discussion above has revealed that substantial improvement is both possible and necessary in this regard.

Second, indicators also perform a normative function. Every development indicator is based on a particular concept or definition of development, involving specific values, goals and standards. Hence the use of a particular indicator places the emphasis on the underlying development concept. As a consequence, those aspects of development not adequately reflected in the indicators are faced with the risk of being ignored in the development policy debate.

The development indicator used therefore exerts a normative impact, which is assessed as follows with regard to the fifties and sixties: "As no possibility for measuring social conditions existed, economic variables such as GNP and all its derivations were increasingly used to 'measure' social conditions and social progress. As development planning was introduced more and more widely these economic variables became criteria for determining the course of development" (my italics).²³

The HDI places the emphasis on human development as the objective of development processes. Hence, the HDI questions per capita income as the dominant development indicator and creates a counterweight to the growth-oriented development concepts associated with per capita income. In this sense, the annual publication of the HDI in the UNDP's Human Development Report is to be seen as a counterweight to the annual publication of figures on per capita income in the World Bank's World Development Report.

²⁰ D. Seers: What are We Trying to Measure?, in: N. Baster (ed.): *Measuring Development*, London 1972, p. 27.

²¹ The normative function of development indicators is discussed below.

²² D. Nuttall: The Functions and Limitations of International Education Indicators, in: OECD: *The International Education Indicators*, Paris 1992, p. 13.

²³ J. Drenowski: Social Indicators and Welfare Measurement: Remarks on Methodology, in: N. Baster (ed.), op. cit., p. 77.

In addition, the choice of development indicators implies a normative role with regard to the data collected. Of course, statistical systems define the range of available data that may be used as development indicators. However, the type of data collected also reflects priorities and is therefore determined to a large extent by the attitude towards development. "What work is done by a statistical office depends in practice partly on what its own government demands, partly on the advice it receives from various U.N. agencies."²⁴ Indeed, the UNDP considers the filling of gaps in the collection of social and human data and the improvement of existing statistics as one of the purposes of publishing the HDI.²⁵ The greater use of the HDI can therefore help foster the use of standard definitions and data collection procedures and the collection of relevant data.

Third, development indicators have an evaluatory function. They are based on normative concepts involving goals and standards which make it possible to compare a present state to a preferred one. Consequently, indicators can be used to evaluate the level of development reached and monitor its progress. In order to be able to perform its evaluatory function, the indicator must be comparable over time. After a number of important modifications, the latest version of the HDI now displays this characteristic.

Finally, indicators take on a decision-making function if they are used "to prepare the ground for political planning and decisions".²⁶ If indicators show that a country has made progress or fallen back in relation to the normative objectives, concrete political measures may follow. Obviously, indicators cannot force action to be taken, but the "planning of any action is badly impaired if its aims and prospects cannot be given a quantitative expression".²⁷

The priorities of development policy have changed in recent years as a result of the "lost decade"; in particular, "the importance of working consciously to ... protect and promote 'human' development in adjustment and development programmes, rather than allowing these matters to derive from more

'productionist growth' policies, is now agreed again, after a decade of neglect".²⁸ Human development has thus become a widely recognised objective of development. This fact implies an important and growing role for the HDI in the evaluation of developmental progress and in development policy decision-making.

Conclusion

Ever since it was first introduced, the HDI has been the subject of severe criticism, mainly on methodological grounds. This is due partly to the fact that the UNDP introduced the HDI in a relatively vulnerable format. The UNDP intended to open the debate²⁹ and then to improve the HDI in the light of the criticism it provoked. Unfortunately, this resulted in a discussion of the HDI that focussed essentially on its methodological weaknesses. The UNDP would therefore have been better advised to present a more soundly based and consistent version of the HDI for general release. The focus of the debate would then undoubtedly have been different.

Analysis of the measurement concept shows that in its present form the HDI cannot guarantee the validity of the measurements regarding human development. However, it has been possible to demonstrate that the measurement methods could be improved in many places. The UNDP should therefore develop and refine the measurement concept further, in accordance with its stated intentions.

When assessing the HDI, it must be remembered that all the development indicators used hitherto have also suffered from considerable conceptual, methodological and technical shortcomings. In particular, per capita income can no longer be justified as the dominant indicator for measuring development in view of its conceptual flaws.

The special significance of the HDI lies in its normative function. It emphasises human development as the development objective and therefore sets new development goals and standards. In this function the HDI acts as a counterweight to the growth-oriented development concepts associated with per capita income.

Finally, the HDI represents the human development concept, a concept that has won broad consensus in development policy, especially since the experiences of the "lost decade". The success of development efforts must therefore be measured in terms of the progress made in human development. This implies much greater use of the HDI as a development indicator.

²⁴ D. Seers, *loc. cit.*

²⁵ UNDP, *op. cit.*, 1990, p. iii.

²⁶ D. Nohlen and F. Nuscheler, *op. cit.*, p. 456.

²⁷ J. Drenowski, *loc. cit.*

²⁸ G. K. Helleiner: From Adjustment to Development in Sub-Saharan Africa, in: UNCTAD Review 1994, New York and Geneva 1994, p. 148.

²⁹ UNDP, *op. cit.*, 1990, p. iii.