

# Guide on Measuring Human Capital -

## *Summary from the UNECE Task Force Guide on Measuring Human Capital*

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The Guide on Measuring Human Capital was developed by United Nations Economic Commission for Europe (UNECE) Task Force (TF) on Measuring Human Capital. The Task Force was established by the Conference of European Statisticians (CES) in June 2013 with the objective to pursue the conceptual development of human capital measurement, including experimental human capital satellite accounts. The TF consisted of Norway (Chair), Australia, Canada, Italy, Netherlands, New Zealand, Poland, Slovenia, United Kingdom, United States of America, the Organisation for Economic Co-operation and Development, the Wittgenstein Centre for Demography and Global Human Capital, the University of Wisconsin-Madison, the Central University for Finance and Economics in Beijing and the United Nations Economic Commission for Europe.

The Guide discusses the concept of human capital, methodological and implementation issues, and challenges related to its valuation. It provides recommendations aimed at producing estimates that are as consistent as possible with national accounting concepts and comparable across economies. The Guide also proposes the set up of two satellite accounts - Satellite Account on Education and Training and an extended Human Capital Satellite Account.

The Guide was approved by the CES Bureau in October 2016 (ECE/CES/STAT/2016/6, United Nations publication, ISBN 978-92-1-117120-4) and supported the proposed future work, including developing terms of reference for the pilot testing of satellite accounts for education and training by a group of countries. Based on the pilot testing, a more detailed compilation guide for such satellite accounts could be prepared. A Task Force on Satellite Accounts for Education and Training (chaired by Norway) was established spring 2017 under the CES and its Bureau. The Task Force is created for two years, after which it will submit a final report

## **Guide on Measuring Human Capital**

### **1. Introduction, overview and main conclusions**

#### **1.1. Why this guide?**

1. Understanding human capital is of significant interest to policymakers. Statistics on human capital may help to understand the drivers of economic growth and the functioning of the labour market, as well as to assess the long-term sustainability of a country's development path.

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<sup>1</sup> The paper is based on the introduction chapter in the Guide on Measuring Human Capital

2. Based on the outcome of a Conference of European Statisticians (CES) seminar in 2011 and the recommendations in the subsequent stock-taking report, CES established the Task Force on Measuring Human Capital in 2013. Its objective is to pursue the conceptual development of human capital measurement, with priority on developing experimental human capital satellite accounts. In addition the stock-taking report recommended that further work should be carried out in the following areas: investigating the discrepancies between the cost-based and income-based approach; improving the quality of data collected internationally; and pursuing work to estimate the non-economic returns to human capital.

## **1.2. Importance and policy relevance**

3. Measuring the stock of human capital can serve many purposes, i.e. to better understand what drives economic growth, to assess the long-term sustainability of a country's development path, and to measure the output and productivity performance of the educational sector. While all these perspectives emphasise the importance of measuring the total stock of human capital, more recent discussions on 'beyond GDP' have led to growing attention being paid to the distribution of human capital across households and individuals, and on the non-monetary benefits stemming from it.

4. Maximizing current income and consumption in a context of limited resources will not assure the sustainability of a country's development path. Sustainable development, in its inter-generational dimension, is usually understood as requiring that an unchanged stock of capital per capita (including human capital) be passed on to the next generation (UNECE, 2009).

5. To produce meaningful measures of the total capital stock of each country, measures of each of its components are needed. Because of its role in economic accounting, the metric typically used to measure the different types of capital is that of 'money'. Devising a robust methodology for the monetary valuation of the stock of human capital is especially important as a number of studies have suggested that human capital, measured in this way, is by far the most important component of the total capital stock in most advanced economies (e.g. Greaker et al, 2005; Gu and Wong, 2008; World Bank, 2006, 2011).

6. Not only the total stock of human capital but also its evolution over time provides important information for monitoring sustainability. For instance, measures of changes in human capital due to demographical factors such as population ageing, may provide an early warning of the risk that the accumulation of human capital may not be sustainable over time. This would allow pre-emptive policies aimed at encouraging alternative forms of investments, to offset the decline of total capital stock due to ageing.

7. Recent reflections on the limits of GDP as a welfare measure (e.g. Stiglitz et al., 2009; OECD, 2011; and various EU initiatives) have underscored that people's material conditions (i.e. their economic well-being) are determined not only by current income and consumption but also by the assets they own – e.g. housing property, financial assets and also, importantly, human capital. All these assets generate income streams over their lifetime and provide a buffer against sudden shocks. This individual perspective suggests that, beyond looking at the total stock of a country's human capital, measures of how this capital is distributed are also important.

8. The concept of people's well-being stretches beyond its material side, to encompass a variety of non-monetary dimensions which, together, define people's quality of life. This broader perspective

has implications for the measurement of human capital as it highlights that, in addition to its economic returns, investment in human capital can generate other benefits that will improve individuals' well-being. These non-economic benefits can include the improved health conditions that are generally associated to higher education and which may enhance not just an individual's productivity and earnings but also his/her subjective well-being (Dolan et al, 2008). Furthermore, these non-economic benefits are not restricted to individuals, but can extend to the society at large. For example, education may lead to better-informed citizens, more tolerant of social and cultural diversity and more willing to actively take part in a modern democratic society.

9. While some of these non-economic benefits of education are captured through the monetary measures of human capital that are reviewed in this guide (e.g. the longer life expectancy of more educated individuals), this is not the case for most other benefits. Moreover, the formation of human capital itself may be affected by activities that enhance health conditions as well as family and community well-being. This, again, has also implications for human capital measurement.

### **1.3. Overview of the guide**

10. The guide discusses the concept of human capital, methodological and implementation issues, and challenges related to valuating human capital. The Guide provides recommendations aimed at producing estimates that are as consistent as possible with national accounting concepts and comparable across economies. However, the guide does not recommend the inclusion of human capital in the central framework of the SNA as more research is needed. The Guide suggests starting with a narrower approach, namely the development of a satellite account for education and training. The Guide continues by encouraging the development of a human capital satellite account, and provides an example showing how integration of human capital might influence the sequences of accounts. Finally, the guide provides additional examples of how human capital has been measured in selected country-specific contexts, the type of data used and a comparison of these estimates across countries.

#### **1.3.1. Concepts and definitions (chapter 2)**

11. The chapter on concepts and definitions provides a generic overview of the concept of human capital. It discusses what is meant when referring to human capital, how is it defined, and does the stock of human capital capture only future economic benefits from investing in the development of knowledge and skills? It also discusses issues related to encapsulating non-economic returns such as better health. However, it is noted that for this Guide the concept and related valuation of human capital will, for the most part, be based only on the economic returns.

12. The chapter gives a presentation of what the international standards for compiling national accounts, the 2008 System of National Accounts (2008 SNA), says about human capital. SNA states that expenditures on education and staff training should not be considered as a form of investments in human capital. The concept of human capital is thus not part of the "asset boundary" of the 2008 SNA. However, on the SNA research agenda (Annex 4 of the 2008 SNA), it is mentioned that human capital is an issue that needs further consideration. This Guide can be looked upon as providing more substantial input to these considerations and discussions.

13. Discussion about the economic benefits from human capital and the concomitant principles for the valuation of stocks of human capital, the process that leads to the creation of human capital, in more technical terms the “production process” of human capital, and the elements leading to the accumulation and depreciation of the human capital stock, are covered in the chapter. All of this is first and foremost intended to provide a conceptual framework for, or a way of thinking about, human capital. It is presented in a way that is as much as possible in line with the basic underlying principles of the SNA, albeit that the presented framework clearly goes beyond the current international standards. Two options that could be considered are:

- i. to look upon the relevant activities in the sector paying for the produced services as producing a capital output, and subsequently transferring these outputs, via capital transfers, to the households;
- ii. to look upon the relevant activities in the sector paying for the produced services as producing a non-capital market output that is transferred to the households where it is used as intermediate consumption into the production process of households producing their own human capital.

14. Finally, chapter 2 concludes with some further thoughts about the inclusion of non-economic returns. Different from other topics addressed in the chapter, the issue of including non-economic returns will not be further elaborated in this Guide.

### **1.3.2. Methodological issues (chapter 3)**

15. This chapter looks in more detail at the methodological challenges related to the measurement of human capital. In particular, it looks at the theoretical basis for the cost of production and lifetime income approaches to estimating human capital and the challenges in implementing them. It also discusses briefly how these approaches can be complemented by a third approach, the indicators approach, to provide a more complete picture of what is happening.

16. Regarding measurement of human capital there are a number of considerations that are common to more than one approach outlined in the guidelines – the scope of the estimates, the heterogeneity of human capital and the aggregation of human capital. Only economic returns that accrue to individual persons having acquired human capital are taken into consideration. No spillover effects will be assessed, not because they are not important, but measurement of them is not yet well established and lacking sufficient practical examples.

17. The Guide only considers human capital formed from of education and job-related training. In general, the quantity of human capital is considered to be represented by two commonly adopted indicators: educational attainment and job-related training. Human capital skills are generally distinguished into two kinds: general-purpose skills and firm-specific skills. The empirical literature on the measurement of human capital has focused on general-purpose skills, partly because these are easier to measure.

18. There are challenges surrounding the heterogeneity of human capital in the economy outside the scope of the study. Workers differ in their human capital skills, suggesting heterogeneity of human capital in the economy. The assumption that workers with the same category of productive characteristics have the same level of human capital skills may be problematic. In terms of education,

for example, a worker with the same level of educational attainment may have a different level of human capital from his peers in the same category of productive characteristics, due to differences in schooling quality. While some methods are available for adjusting for quality differences, it is difficult to do so consistently in a cross-section and over time.

19. The final key challenge common to all approaches is aggregation. Aggregation is one of the most contentious issues in capital theory, and this also applies to human capital. Measures of human capital focus on individuals' human capital and aggregate them to arrive at the population measure. This ignores spillovers between workers so that the whole may be more than the sum of the parts.

### **1.3.3. Implementation and measurement issues (chapter 4)**

20. This chapter aims to be a practical implementation guide for national statistical offices compiling human capital estimates. It discusses issues in implementation and measurement for each of the three approaches described in chapter 3. As stated earlier, the framework of this Guide is confined to economic returns, formal education and job-related training, and the working age population. This chapter adds to this a focus on internationally comparable measurement and data. Recommendations are made for the extent of implementation and data sources in order to arrive at internationally comparable estimates of human capital<sup>2</sup>.

21. If capital markets were perfect, the cost-based and lifetime income-based approaches would generate similar estimates (Le et al., 2003). In practice, the lifetime income-based method gives a substantially higher estimate than the cost-based method (Abraham, 2010). However, it is not essential that the cost based and lifetime income based approaches match when accounting for human capital within an SNA framework. The two methods start from rather similar conceptual perspectives; the main difference is in the measurement, leading to differences in estimates. The lifetime income method starts from income data on individuals by level of education, and the cost based method from the source of expenditures. Country do not need to make a choice between the two approaches, both have advantages and disadvantages. Policy makers and researchers may get much information from both approaches. Further, indicators on human capital can serve as a complement or even as a benchmark (e.g. test scores) in analysis of investments in and stocks of human capital. For instance, one may link proportions of students enrolled by gender, age and education level to expenditures data in an analysis of data constructed in satellite accounts for education and training and for human capital.

22. Chapter 3 describes the theory, and chapter 4 shows the (im)possibilities of estimation. We need to be pragmatic on various estimation issues, e.g. on labour participation, retirement ages, migration, and discount rates. Each country estimating human capital should conduct sensitivity analyses to show the impact of the various assumptions and alternative data sources.

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<sup>2</sup> As is often the case when developing new statistics, input may be needed from a variety of agencies and institutions depending on the organization of official statistics in each country. Coordinating efforts across agencies can be an important factor in the success of any complex project such as measuring human capital.

### **1.3.4. Satellite account for education and training (chapter 5)**

23. Given the aim of linking human capital estimates to the System of National Accounts (SNA), a first step could be the development of a Satellite Account for Education and Training. The construction of such a satellite account is relatively straight forward as most of the cost data are already available in national statistical institutes (NSIs). Such a satellite account can in-itself present an important analytical tool for supporting analysis and policy-making decisions and in addition, can provide a foundation for enhanced human capital studies at the international level.

24. This chapter present the setup of a satellite account for education(hereafter SAE), both formal and non-formal<sup>3</sup>, including training able to supplement the SNA core system and using data that are already largely available in the core accounts of SNA. The proposed scheme includes a set of main tables and other supplementary tables. It should include detailed information on financial transactions, thus being able to distinguish between who is producing and who is financing the total expenditure on education services.

25. The SAE extends the production boundary of the SNA only slightly to recognize own account production of training. The idea is to provide policy makers with more detailed data on the expenditures on education, and the financing of these expenditures. The expenditure data can be linked to other indicators on human capital such as proportions of students enrolled by gender, age and education level. Supplementary tables, such as employment broken down by educational attainment and industry are recommended. In this respect, it can be noted that labour is the most important factor of production, which means that such analysis is crucial for the enhanced study of multifactor productivity.

### **1.3.5. Human capital: Going beyond System of national Accounts (chapter 6)**

26. This chapter moves to treating expenditures on education and training as investments rather than current expenses. This requires changes to a number of accounts within the SNA depending on which of the options presented in the chapter on concepts and definitions are used. In chapter 6, a proposed treatment is demonstrated through the use of a satellite account for human capital. This satellite account provides an example of how economic aggregates such as gross domestic product, investment, consumption, saving and national net worth would change when expenses related to human capital are classified as investment rather than as current expenditures, see also paragraph 13.

27. Using the structure of the SNA to integrate skills and knowledge as a form of capital, the satellite account presents additional information on the link between human capital and economic

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<sup>3</sup> Learning activities differ in their degree of formality. On the one end of the spectrum lies the hierarchically structured formal education system, where individuals belonging to a defined clientele register and enrol, and students follow a defined curriculum and are awarded a certificate upon successful completion. On the other end of the spectrum lies entirely informal learning that happens spontaneously as part of day-to-day life, with family, friends, and neighbours, or through engagement with the media or libraries, for instance. While this spectrum forms a continuum, the mentioned ideal types of formal and informal education are customarily complemented with a single category falling in-between, namely non-formal education. This encompasses learning activities, such as voluntary classes organized by community groups, that exhibit some characteristics of formal education, such as a set time and place and defined learning objectives, but may lack others, such as recognized certification.

performance, while simultaneously retaining the core strengths of SNA estimates. The size of investment in human capital provides an assessment of the role of skills and knowledge acquired through education and training in economic and productivity growth. It can be compared with other types of investment such as investment in machinery and equipment, buildings and structures and research and development to provide an examination of their relative importance for economic growth. Total capital stock estimates in the expanded balance sheet provide information on the evolution of total capital stock and the sustainability of development in an economy. The saving estimates that are adjusted to include saving in the form of human capital provide a richer view of saving by households and governments.

28. Consistent with the Guide, chapter 6 focuses on formal education and formal training. Including investment in human capital in the SNA raises a number of challenges. Among the most pressing are how to structure the treatment of human capital investment through the sequence of accounts<sup>4</sup> in the SNA, the choice of an appropriate price deflator for human capital investment, the choice of an appropriate depreciation rate for human capital, and a reconciliation of alternative methods for estimating the human capital stock and the underlying investments.

29. The chapter explores the effect of measuring human capital on the SNA using both the income- and cost-based approaches. The income-based approach is employed in empirical studies of human capital, and produces a larger estimate for the human capital investment than that implied by the cost-based estimate.

### **1.3.6. Human capital country studies (chapter 7)**

30. There are a large number of country specific human capital studies, some of which look at several countries and others which focus on one country. This chapter surveys a representative sample of them. A country ranking table is presented in the main body of this paper. It includes 10 rankings by six different types of human capital measures: Programme for International Student Assessment (PISA), Programme for International Assessment of Adult Competencies (PIAAC), Barro-Lee, Inclusive Wealth Report (IWR), Jorgenson-Fraumeni (J-F), and World Bank. Only J-F human capital measures have been previously described in this report, accordingly the other human capital measures are briefly described in this chapter.

31. There is a clear trade-off between the scope of the data needed for a measure, the sophistication of the measure, and the number of countries for which estimates currently exist. For example, the IWR (UNU-IHDP and UNEP 2014) measure which uses country averages exists for 140 countries, while J-F which uses detailed country information exists for some 20 countries.

### **1.3.7 Recommendations and future work (chapter 8)**

32. The Guide shows that it is feasible to construct human capital satellite accounts. It provides an example of constructing such a satellite account, which shows the impact of human capital on the values of GDP, investment, consumption, savings and net wealth.

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<sup>4</sup> This will depend on the option chosen for presenting the production of human capital.

33. Statistical agencies must overcome a number of challenges for the construction of a human capital satellite account. The most pressing challenges include the following:

- a) to choose between alternate models of where human capital is produced,
- b) to structure the treatment of human capital investment through the sequence of accounts in the SNA,
- c) to obtain sufficiently comprehensive and detailed estimates of the costs of education and training,
- d) to select an appropriate price deflator for human capital investment,
- e) to select an appropriate depreciation rate for human capital, and
- f) to reconcile alternative methods for estimating the human capital stock and investment.

34. The recommendations in this Guide are a first attempt to come up with an estimate and a recording of the role of human capital in a way that is aligned with the principles of the national accounts. The estimates can either be achieved by developing a satellite account on education, or go beyond the present SNA by fully integrating the narrower definition of human capital.

35. Because of both data constraints and methodological issues, the Guide recommends, as a first step, to develop a satellite account for education and training. The objective of such a satellite account is to distinguish and provide breakdowns of the various expenditures on training and education, including the identification of the financing arrangements for these expenditures. The proposal introduces a slight extension of the production boundary as it recommends recognizing the output from the internal expenditures on education and training by employers.

36. For estimating of the value of human capital stock, the Guide recommends the use of either the “cost-based approach” or the “lifetime income approach”.

37. The cost-based approach starts from the Perpetual Inventory Method (PIM) calculating the human capital stocks as the depreciated value of the monetary costs of the investment in human capital. The data requirements for implementing this method are expenditures on formal education and job-related training, foregone costs for students in education and employees in training, a depreciation rate related to the various investments in human capital. Data on initial human capital stocks and price indices are needed as well. Assumptions need to be made regarding the rate of depreciation, and the service lives and depreciation pattern of the relevant assets.

38. The lifetime income approach is based on the net present value of the future benefits earned from human capital. These benefits are usually based on labour income by different categories of age and educational attainment. The method requires detailed data on labour earnings, employed persons by sex, age, educational attainment and school duration, as well as survival rates, income growth and a discount rate.

39. From a theoretical point of view, the net present value estimate from the lifetime income approach is preferable, as it adds all future benefits that can be allocated to the relevant asset, thus replicating a market-equivalent valuation. Its measurement however requires quite a number of assumptions on the future development of the (active) population and the development in the level of economic benefits. It is also significantly affected by the discount rate that is applied. For that reason, a cost-based estimation is recommended as an alternative method.

40. Usually, the estimates from the lifetime income approach are substantially higher than the ones based on the cost-based approach. Various reasons may cause this difference, obviously one of them being that not all future labour income can actually be attributed to human capital. Another

reason may be that part of human capital is actually not produced, but for example genetically inherited.

41. From a purely conceptual point of view, one can argue that in a setting of perfect competition, the cost-based approach ought to result in an estimate which is equal to a valuation estimated using the lifetime income approach. In the “production process” of human capital that is further elaborated in the Guide, the difference between the costs/inputs and the benefits/outputs are attributed to an operating surplus/mixed income resulting from investing in education, be it formal or informal.

42. More research is needed on the formation of discrepancies between results from the cost-based and income-based approach, included improving the quality of data collected. Another important research area is the estimation of non-economic returns to human capital, which currently poses formidable definitional and measurement challenges.

43. While the Guide shows how a satellite account may be used to present the production of human capital in the SNA, it does not address all the changes that would be needed for a full integration of human capital as a produced asset. More detailed conceptual consideration of issues such as compensation of employees are required to fully understand what integration of human capital into the framework of national accounts would mean in terms of reshaping our understanding of the economy.