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Sustainability from a National Accounts Perspective

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Sustainability from a National Accounts Perspective

Summary

In this paper we present the work that Statistics Netherlands is doing with three other government agencies on sustainability. This project aims to build datasets which will enable policy makers to evaluate to what extent societal developments in the Netherlands meet the criterion of sustainability. We base our analysis on a broad capital perspective, including forms of human, natural and social capital which are not yet part of the SNA. This paper indicates on which theoretical and practical grounds we have arrived at the indicator set which will be the basis of the to-be-published Dutch Sustainability Monitor.

1. Introduction

The concept of sustainability is prominently placed on the political and academic agenda. The recommendations of the Brundtland Commission (World Commission 1987) as formulated in the famous report 'Our Common Future' are still an integral part of the debate. The report argued that economic growth, a good quality of the natural environment, as well as a less skewed (international) income distribution should be important policy goals. It was claimed that these different goals can all be realised if society makes choices which ensure that societal development is truly *sustainable*.

The debate on sustainability is characterised by two dimensions. First of all, the literature emphasises a so-called broad welfare concept (Hennipman 1945 and 1977). This means that many authors have stressed that welfare is more than the goods and services which as recorded in the National Accounts. Although GDP was never meant to be used as a welfare indicator, it is often used as such in political as well as academic debates (Van den Bergh 2006). This has resulted in a current of literature which emphasises the importance of aspects such as social cohesion and the quality of the natural environment. These aspects are only partly or not at all integrated in the core of the System of National Accounts (SNA).

The broad welfare concept is an integral part of the sustainability debate. However, even more important is the second aspect which relates to inter-generational aspects. Sustainability literature puts emphasis on the question as to what extent choices that are made at present, may make it more difficult or even impossible for future generations to realise *their* welfare goals. Societal development is only *sustainable* provided that it is not at the expense of the welfare of future generations. It remains to be seen if the ambitious goals as formulated by the Brundtland Commission (economic growth, good quality of the natural environment as well as a fair income distribution) can actually be realised (see Tinbergen and Hueting 1992). We simply lack the statistical information to evaluate policy in terms of the degree of sustainability.

In the Dutch project on sustainability –in which Statistics Netherlands co-operates with three other policy institutions[1]- a new set of statistics and indicators is being developed in order to describe and evaluate these issues. Sustainability is operationalised using a *capital* perspective

[1] The CPB Netherlands Bureau for Economic Policy Analysis, the Social and Cultural Planning Office of the Netherlands; Netherlands Environmental Assesment Agency. The indicator system developed in this project of Statistics with the three other institutes, is introduced in section four of this paper. The satellite accounts discussed in section five will be carried out at Statistics Netherlands.

(CES 2008).[2] Only in case that the amount of capital per caput remains constant, the criterion of sustainability is met as it provides future generations with at least the same amount of capital which it can use to realise their welfare goals.

In section two we will deal with some conceptual issues concerning welfare and sustainability. It will be demonstrated how the conventional type of analysis based on utility maximalisation can be broadened on the basis of, among others, insights from the happiness literature, behavioural economics as well as the social production function literature. On the basis of these insights we will show through which channels capital accumulation (using a *broad* capital concept) affects welfare. Section three focuses on the broad capital concept. After a short discussion of the conventional types of capital which are already included in the core national accounts, we will introduce new types of human, natural and social capital which should be included in order to arrive at a thorough analysis of welfare and sustainability. We will show that some of the challenges in operationalising these new forms of capital (especially social capital) can also be found in the more traditional types. We will show that problems regarding ownership of assets, the degree to which asset owners can capture their rents, can be found in the conventional types of capital as well as the 'new' types. Section four deals with the quantification of broad capital concept and will discuss which indicators for economic, human, natural and social capital have been developed in the Dutch project. In section five we will give some examples at to how sustainability indicators can be integrated in a SNA framework. Section six summarises our main findings.

2. Welfare and Sustainability: Some Conceptual Issues

We base our work on sustainability on Brundtland's definition which emphasises that developments are sustainable in case the present generation meets its needs without compromising the ability for future generations to meet their own needs (World Commission 1987). In other words, in order to enable future generations to realise their welfare goals we need to ensure that enough means of production are left intact. The capital approach is of vital importance in the analysis of sustainability as means and goals are linked to one another in a production function. This will enable us to show which goals can be achieved on the basis of the supply of (scarce) capital goods, but it also enables us to monitor whether the stock of capital does not diminish to such an extent that it will harm the interest of future generations.

[2] The capital approach which is adopted is a hybrid capital approach i.e. each form of capital is measured in the appropriate units (see Kulig et al. 2008). This is different to the monetary capital approach (see for example World Bank 1997 and 2006) in which all capital stocks are monetarised.

Of course, we need to broaden the scope of the conventional economic production function in order to capture elements which are not part of the SNA's core. The social production function literature may be helpful as sociologists try to define welfare goals and to link these to means of production (in a broad sense) in a way which closely resembles the economic production function (Lindenberg 1989). It should be noted that the concept of welfare is "empty" in the sense that economic theory does not provide us with clues as to which goals are important in the process of welfare creation (Cf. Hennipman 1945 and 1977). Only empirical research based on surveys may give an indication of the nature of social preferences.

For the Netherlands Van Bruggen (2001) operationalised this function. The social production function builds on the basic notion that individuals produce their own well-being. Van Bruggen defines some first-order instrumental goals that individuals aim to achieve in order to increase their well-being. In the definition of the main goals a broad welfare concept is used. Apart from the aspects which are part of the traditional utility function, also the quality of social networks –and the well-being that individuals derive from them- is included. The social production function literature identifies the following means which are needed to generate welfare:

-The consumption of goods and services results in satisfying needs on the basis of which goals in terms of physical well-being can be realised.

-Besides, 'assets' such as education, health and financial income are welfare increasing.

-In order to realise high levels of social well-being it is important that individuals are firmly embedded in social networks.

The social production function literature as well as work on the economics of happiness is largely based on information about individual preferences, as a result of which ecological elements may be downplayed. Natural capital, which can be seen as a form of 'critical capital', is not always identified by individuals as a main bottleneck in the creation of welfare. Nevertheless, notwithstanding our present-day preferences, the future of our planet does depend on our use of 'natural capital'. A proper welfare analysis should therefore not be based exclusively on individual preferences. Besides, imperfect information at present may lead to types of human behaviour which may threaten the (quality of) life of future generations.[3]

Figure 1 shows the channels through which capital affects welfare.

[3] The problem of irrational behaviour by 'rational' individuals is stressed by: Van Praag (1968) and Sen (1977, 1995 and 1996).

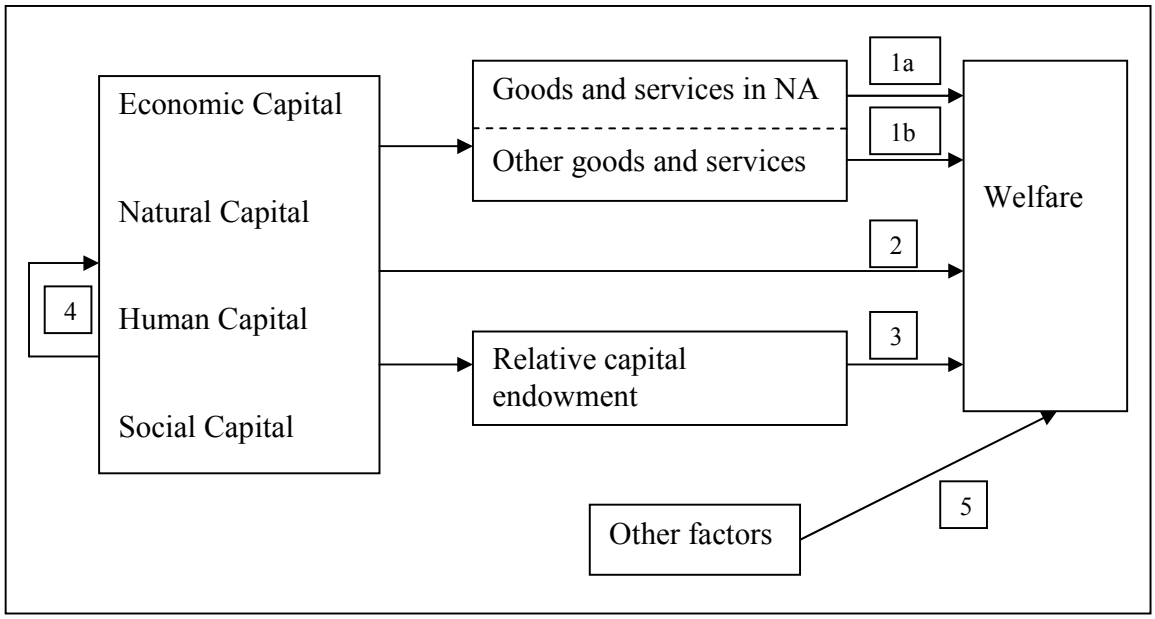

Figure 1. How does capital influence welfare?

Conventional economic literature bases its welfare analysis on the idea of utility maximisation. This type of analysis is often confined to the consumption of products which are included in the system of national accounts (**channel 1a**). However, also non-market activities such as the production from households need to be taken into account. We need to step outside of the traditional SNA boundaries in order to arrive at a more complete study of welfare and its main determinants (**channel 1b**). The World Bank (2003) refers to channels 1a and 1b as the "indirect route" because the capital stocks influence welfare indirectly through the goods and services which are produced.

The literature on the economics of happiness emphasises that well-being does not solely depend on consumption. In other words, capital can also affect welfare directly. Enjoying the ownership over certain "assets'", such as the attainment of a high level of education or good health, may also lead to higher levels of well-being (Lomas 1998, Healy 2001). Owning these types of capital is welfare-enhancing in itself (**channel 2**). Apart from those forms of capital which individuals may desire, also natural capital should be included (even in case individuals do not indicate a clear preference for this type of asset). Natural reserves have a value in themselves which do not necessarily depend on the fact whether mankind actually make use of this supply.[4]

The discussion on welfare needs to be broadened with notions derived from the happiness literature (Frey and Stutzer 2000; Bruno and Porta 2005). The well-being of individuals also

[4] The SEEA distinguishes the option, bequest and existence values of natural resources.

depends on their relative income level and consumption pattern in comparison with their social environment (Helson (1964), Smith et al (1989), Lucas en Diener (2000), Hagerly (2000)) **(channel 3**). To some extent welfare is a *relative* concept as the extent to which people are satisfied depends on their social environment. The same kind of phenomenon can be discerned over time. Individuals have certain preferences and define specific goals (Stigler en Becker (1977), Becker (1996) and Bowles (1998)). However, once these goals are met their appreciation tends to decline.

Besides, one form of capital may have an impact on the growth of other forms of capital (**channel 4**). This is especially the case for social capital, which can be seen as an enabler of the increase in other types of capital. However, such capital complementarities are not restricted to social capital. Economic literature also stresses capital-skill complementarities; investments in new types of machinery also lead to the accumulation of human capital as workers need to be trained to use the new machinery and equipment (Goldin and Katz 1999).

Last but not least it should be noted that the ways in which individuals value their existence, also depends on strictly individual, psychological factors (Zajonc (1980), Argyle (1987), Kahneman et al (1999), Bradburn (1996), Lewin (1996), DeNeve en Cooper (1998)) (**channel 5**).

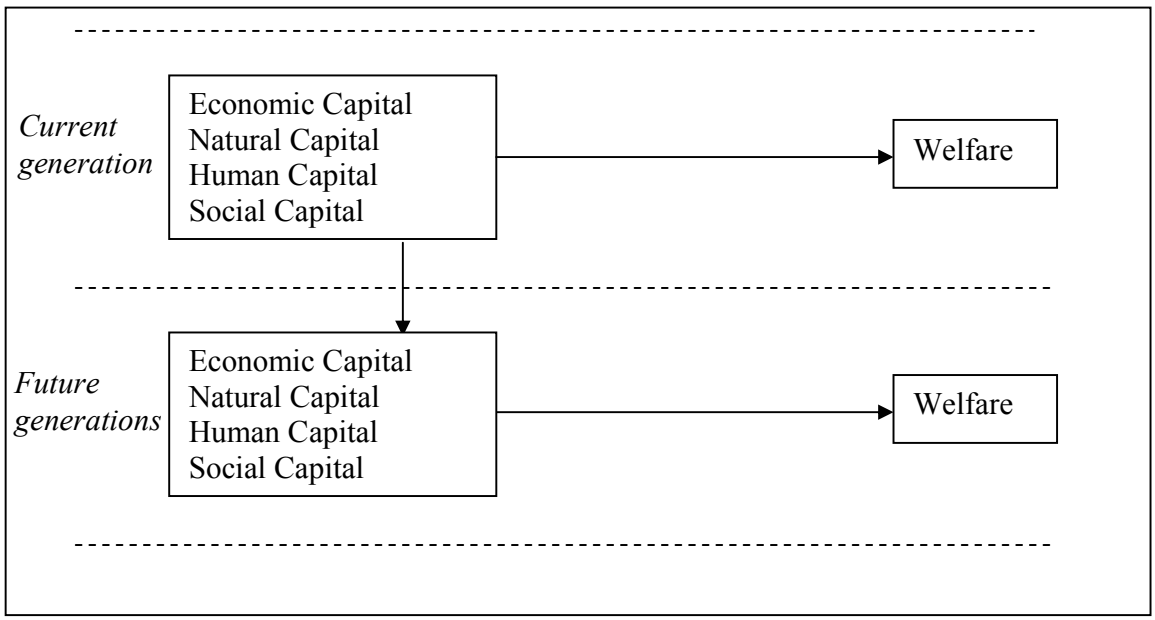

Figure 2. The capital approach to sustainability

Figure 2 is a graphical representation of the Brundtland definition of sustainability from a capital perspective. The welfare goals of a generation are met by using capital in the broadest sense of

the word. If future generations are left with enough capital they will be able to reach a welfare level which will at least be as high as that of the present generation, this is refered to as sustainable development. Of course, this definition of sustainability in terms of non-declining levels of sustainability should not be interpreted in too restrictive terms:

(1) First of all, in some cases economic activity inevitably leads to a decline in the amount of capital (think of non-renewable resources such as oil and natural gas). However, in this case additional criteria for sustainability can be formulated. Following El Serafy (1989) the use of non-renewable natural resources is acceptable in case part of the profits is re-invested in renewable forms of resources. For example, by investing part of the proceedings of oil and gas exploitation in sustainable forms of energy such as wind and water energy, a sufficient supply of energy can be guaranteed in the long run.

(2) Scarce forms of capital can sometimes be substituted for by other types. From the perspective of strong sustainability *all* types of capital should remain intact, but when working with weak sustainability the decline of one type of capital can be compensated for by a rise in other forms. For example, in case the economy becomes more knowledge intensive a decline in physical capital (machinery and equipment) is not necessarily harmful, as long as the stock of knowledge capital is increasing. We should bear in mind, however, that some types of capital such as clean air and biodiversity are forms of critical capital on which, ultimately, the survival of mankind depends.

(3) Last but not least, we should take technology into account. In case we are able to use capital more efficiently, less capital is needed to meet our welfare goals.

In section three we discuss the implications of broadening the capital concept from a national accounts perspective.

3. Towards a broad capital concept

As we have shown in the previous section it is fruitful to think of sustainability within the capital framework. In this section we will explore the concept of capital further and argue that the existing (economic) definitions are too narrow. Nevertheless, we argue that if a broad capital concept is adopted, the differences in the types of capital are gradual rather than structural. Particularly in the case of social capital we argue that it is not merely a “metaphor”, but truly should be regarded as a societal asset (see Grootaert 1997; Grootaert and Van Bastelaer 2001). Before we discuss the conceptual aspects surrounding the definition of capital, we will briefly introduce each type of capital.

Economic Capital

Economic capital is the most advanced form of capital in economic thinking and the statistical system. Its measurement is laid down in handbooks such as the SNA and the OECD manual of "Measuring Capital" (OECD 2001). When we think of this category we usually think of traditional (produced) tangible assets such as machines and buildings. However produced intangibles (e.g. software), non produced tangibles (land and natural resource stocks) and non-produced intangibles (transferable contracts and purchased goodwill) are also defined by the SNA, although statistical institutes often lack the sources to produce estimates for many of these categories. In the revision process of the SNA it has also been decided to expand the asset boundary to include R&D.[5]

Natural Capital

This type of capital is also well developed in the scientific and statistical world. Admittedly there is less agreement on scope and measurement as economic capital, but the System of Environmental and Economic Accounts (SEEA 2003) does provide an internationally agreed starting point.[6] The SNA defines 3 categories; Natural Resources (energy and minerals, soil, water, biological); Land and Ecosystems. Note that the former two overlap with the assets defined within the SNA.

Human Capital

Human capital includes the educational attainment, skills and experiences of the population of a country. Although in the statistical system includes many attempt to measure the quantity of labour provided, statistics on the quality of the labour force are less well developed in the National accounting sphere. A notable exception is the EUKLEMS project which breaks down the hours worked per industry into the level of education of the workers.[7] Even though the quantification of human capital is still in its infancy, there is a wide range of theoretical literature in this field which discusses monetary valuation methods of the stock of human capital and which deals with the economic effects of human capital accumulation (Cf. Becker 1964 and 1975; Jorgenson and Fraumeni 1995; Barro 2001 and Aulin 2004).

[5] For an experimental series on Dutch R&D capital from 1969 onwards, see: Van Rooijen-Horsten et al. (2008).

[6] De Haan en Keuning (1996) presented the first version of the Dutch NAMEA.

[7] At Statistics Netherlands work is carried out to implement human capital (labour distinguished by type of educational attainment) in the growth accounts.

Social Capital

Social capital is the most recent addition to capital (Bourdieu 1986; Putnam 1993, 1995 and 2000; Fukuyama 1995 and 2000; Grootaert 1997; Dasgupta 2000 and 2002; Durlauf and Fafchamps 2004). The social capital literature shows that the networks and the trust which exist within a country are important factors which drive economic growth (and welfare in a broader sense) (World Bank 2006). Even though most economists and social scientists agree that social capital has a decisive impact on welfare, some argue that it is more a metaphor than that we are actually dealing with a form of capital in the strict sense of the word (Quibria 2003). Before we will discuss social capital, we will therefore focus on the definition of capital within the SNA framework in order to find out to what extent the problems concerning social capital are indeed unique, or that they also occur in the more conventional forms of capital.

Definition of capital

Few papers which deal with capital explicitly discuss the properties or definition of capital. Economists will probably stress three properties as articulated by Arrow (2000): (1) There is a time dimension; (2) consumption is delayed in order for growth in future; and (3) ownership can be transferred from individual to the other. This narrow economic interpretation is also reflected in definition for assets in the System of National Accounts (SNA):

> *Assets are entities functioning as stores of value and over which ownership rights are enforced by institutional units, individually or collectively, and from which economic benefits may be derived by their owners by holding them, or using them, over a period of time (the economic benefits consist of primary incomes derived from the use of the asset and the value, including possible holding gains/losses, that could be realised by disposing of the asset or terminating it).*

It is clear that the above definition is too restrictive when it comes to the three other forms of capital. This strict legalistic definition clearly has merit because it is at the base of the National Accounting system which aims to produce internationally comparable statistics. A clear and indisputable definition is therefore required. However, the necessity to broaden the scope of the asset boundary is already acknowledged in the SEEA. The SEEA justifies the broader concept by stressing the environmental functions that are provided by the environment rather than aspects of ownership. However, it does not provide an alternative formal definition. Since a broader definition of an asset would greatly enhance the theoretical and statistical basis of the capital approach we will explore four aspects: ownership; spillovers and capital complementarities; stocks and flows; and rewards/investments.

Ownership

The SNA definition of capital stresses that "ownership rights are enforced by institutional units" and that these rights are transferable and enforceable. Clearly it is this characteristic which many natural, human and social assets do not posses. The first point that we make is that ownership, even within the realm of economic capital, is somewhat more complex than this definition suggests.

Ownership rights will usually be interpreted as the legal documents and contracts with which ownership is governed. Clearly, from the point of view of fixed capital (machines, buildings and land) this is a logical definition. However for intangible assets, such as knowledge, the possibilities to legally "own" the asset are limited. In fact, knowledge can only be legally protected if it is unique (through patents and copyright registration for example). However, a large portion of innovations is not protectable, while it will still clearly be regarded as an asset by companies.

There are however informal mechanisms by which companies may protect their knowledge. For instance, a widely used way of protecting knowledge is through secrecy. Well-known examples are the Coca Cola recipe; the Google search algorithm; and the source code for the Windows operating system. Clearly, these companies have an "ownership right" but from a legal standpoint they cannot exclude others from using the knowledge once the secrets are revealed.

The revision of the SNA 1993 includes R&D in the asset boundary. Insofar as innovations are included which are not legally protected, this expansion implies a broader asset boundary.[8] This shows that even in the realm of economic assets the issue of ownership rights is not as clear cut as economic theory or the SNA 1993 suggest.

In the realm of natural and social capital the issue of ownership becomes more complex because of the existence of public goods. In some cases one could identify a national "ownership" but in many cases they are global public goods. In the case of human capital the "ownership" lies with the individual.

[8] The asset boundary would be expanded even further if "freely available R&D" is included. This is currently a debate in the SNA revision. Its inclusion would imply a further expansion of the asset boundary because it clearly has the characteristics of a public good with no clear ownership rights.

Spillovers and capital complementarities

A spillover is also known as an external effect which occurs when an economic activity causes external costs or external benefits to a third party. For example, companies will innovate but are unable to prevent knowledge spillovers to other companies. This means that other companies are able to take advantage of the knowledge created elsewhere. An example of external costs is when economic growth leads to environmental damages. Capital complementarities refer to the fact that capital stocks are not independent of each other but work together. For example, the extent to which the skills of the labour force are compatible with prevailing technologies is very important in the amount of welfare generated. It is acknowledged that spillover effects and complementarities are important characteristics of social capital, but that they can also be discerned by the more conventional types of capital.

Stocks and flows

In the SNA and SEEA the capital account shows how the opening and closing stocks are linked by the flows (investments, revaluations, depreciation etc.). For the economic assets the stocks and flows are often associated with the same institutional sector. However in the broader capital context this does not have to be the case. Take for example human capital. While the capital stock is owned by individuals, the investments are done by individuals; governments (state funded education); and companies (on-the-job training). Clearly each of the agents is also rewarded through wages; taxes and value added in the production process respectively.

Investments and rewards

The SNA uses a rather strict definition for the rewards and investments. Only economic (monetary) benefits and investments are included. However as we have argued in section 2, for sustainability a broader welfare concept is more appropriate. This also implies that rewards and investments can be non-monetary. For example, individuals may invest their time into increasing their human (education) or social capital (time spent with friends or family).

After this short survey of some of the problems concerning the concept of capital, we now return to social capital in order to find out whether some of the problems concerning this concept are of a unique nature or are not different from other types of capital.

Social capital is defined by the networks and trust within society. The social capital literature shows that these are important in the generation of economic benefits and welfare in a broader sense (Knack and Keefer 1997). Note that there are many categories of networks in

society which are important. The relationships between citizens of different groups (e.g. ethnic) or the relationships between the state and its citizens also fall within the realm of social capital.

We now analyse social capital on the basis of the four characteristics which we have identified in the previous section.

1. *Ownership*. In many cases, social capital will have the characteristics of a public good over which the ownership rights are not clearly defined. In these cases social capital is similar to natural capital as defined in the SEEA. But in some cases, such as the personal network of a person, or the knowledge networks of a company, the networks can actually be "owned" to some extent. Furthermore, laws and institutions themselves are often themselves regarded as social capital. They are the rules and norms which govern the networks and relationships between people, organisations and governments.
2. *Spillovers and capital complementarities*. The issue of spillovers is also very relevant for social capital. This is best illustrated by the concept of "generalized trust", which is a term which refers to the overall level of trust between the people within a country, whether you know them or not. The literature has shown that this is an important factor in raising welfare. Of course trust is generated at the (micro) level of individuals but as an external effect raises the (macro) level of generalized trust. Social capital is also an important "enabler" of other forms of capital. Social capital stimulates the growth of other forms of capital (and therefore has a favourable impact on welfare). However, spillover effects can also be found in other forms of capital (R&D). The same holds for the issue of complementarities (see the capital-skill complementarity).
3. *Stocks and flows*. Social capital should be defined in terms of networks as well as the trust that is being generated within these networks. The inclusion of trust is important as it comes closer to the concept of capital in an economic sense. From an *investment perspective*, one may prefer to focus on networks (see Bourdieu 1986: individuals invest in networks as they expect network participation to increase their competitive strength). However, capital theory also shows us that the investments result in building up a capital stock. The changes in the size of the capital stock can be followed in the course of time. From a capital *stock perspective* (following Fukuyama (1995 and 2000) and to some extent Putnam 1993 and 2000), a focus on trust is needed. Rising or declining levels of trust can be interpreted in terms of a change in the volume of capital, whereas a change in the size of a network in itself has no meaning (a network can increase in size, while the frequency of contact between its members actually declines).

4. *Investments and rewards*. Van Ark (2002) argues that 'trust' as an indicator for social capital should be seen as a limited indicator as it only deals with the rewards of investments and ignores the costs that were made. However, by analysing social capital using the investment perspective (the extent to which individuals participate in social networks) as well as the stock perspective (the generalised trust that is built up on the basis of repeated interactions between individuals within those networks) a cost-benefit analysis can be made. The benefits of social capital can be monetary (because of lower transaction costs) or non-monetary (because of the direct effect on happiness of socially embedded people). Besides, it must be stressed that costs are made in terms of time, which is sometimes also valued in monetary terms by using opportunity cost calculations.

4. Towards a set of Sustainable Development Indicators

In section three we have explored the broad capital concept which underlies the capital approach which we have adopted. The differences that are exhibited are of a gradual rather than structural nature. The capital approach is therefore a good starting point to produce a set of Sustainable Development Indicators (SDI's).

In the Dutch project on sustainability capital indicators have been constructed for nine themes for the period 1950-present. By examining to what extent the amount of capital per inhabitant has decreased over time, it can be established whether society –for each of the nine themes- is on a sustainable path or not. However, as was put forward in section two, additional indicators are needed to arrive at a more dynamic analysis of sustainability. Therefore, in each of the nine themes additional sub indicators are given. These sub indicators are almost always policy oriented and often flow variables.

By examining the long-term trends of the different kinds of capital, the sustainability of society can be monitored. The sub indicators will give policy makers an indication as to how downward trends in the certain types of capital may be reversed. Besides, as these sub indicators are often important in national or international political initiatives (such as the Lisbon Agenda of the European Sustainable Development Strategy), the trends of these sub indicators can be related to the (inter) national targets which have been formulated. This provides policy makers with additional information to monitor their policies.

In our discussion of the set of Dutch Sustainability Indicators we will start with the headline indicators which are selected for the following nine themes:

1. Fixed capital
2. Knowledge capital
3. Quantity of human capital

4. Quality of human capital-knowledge
5. Quality of human capital-health
6. Climate and energy
7. Biodiversity and nature
8. Participation
9. Trust

The first two categories consist of forms of economic capital which are already part of the SNA (fixed capital) or which will be integrated in the coming years (knowledge capital in terms of R&D). Apart from fixed and knowledge capital, economic literature also points to the importance of human capital, i.e. the quality of the labour force in terms of their level of education.

Human capital is covered in the themes 3-5. First (theme 3) we focus on the amount of labour that society has at its disposal. By examining age structure, (female) participation rates etc. we make an assessment to what extent drastic changes in the volume of labour have occurred in the previous period or can be expected in the near future (on the basis of demographic projections). Theme 4 focuses on the educational attainment of the labour force. Here aspects of formal schooling as well as vocational training will be taken into account. Often, human capital is restricted to schooling. In our dataset we also incorporate health (theme 5), as levels of labour productivity also depend on the health of the labour force.

The themes 6 and 7 focus on two relevant aspects of natural capital which are also to a large extent integrated in the SEEA. The most important broadening of the capital concept relates to social capital, which is measured in terms of participation and trust. Social capital primarily reflects the quality of inter-personal relationships in society. Sociological literature focuses on the formation of social networks. In theme 8 changes in social participation are charted, with special attention to 'bridging' social capital (i.e. the extent to which people from different social groups interact with one another). Theme 9 is more inspired by economic literature and emphasises the level of generalised trust. Of course both variables are closely interdependent. Even though changes in the size of social networks can be interpreted in terms of 'capital stock' changes, it is also possible to view network participation as a flow variable (people invest their scarce time in social interaction), which may result in higher levels of shared norms and values as well as an increase in generalised trust (based on the underlying notion that repeated interactions between individuals lead to higher levels of trust).

When looking for the underlying sub-indicators for each of the nine themes, we found that many of these themes could easily be filled using existing indicators from the Structural Indictor set

(Lisbon strategy) or the European SDI set. As such we are in the process of creating a policy-relevant set of indictors which is solidly based on the capital approach.

Let us illustrate our approach with one example. Table 1 provides the information on labour quality in terms of educational attainment.

Table 1. Labour quality (education) in 2005- The Netherlands

		The Netherlands		European Union (27)			Policy targets		
				Average 2005	Best Practice				
Indicators	**Units**	**Rank in EU**	**Value 2005**		**Value 2005**	**Country**	**EU**	**NL**	**Year**
Youth education attainment level	%	21	75,6	77,5	91,8	Slovakia	85	85	2010
Spending on human resources	€/BBP	13	5,2	5,1	8,3	Denmark			
Life long learning	%	5	15,9	9,7	33,4	Sweden	20	12,5	2010
School leavers	%	17	13,6	15,5	4,3	Slovenia	8	10	2010

This table reveals that the Netherlands ranks quite low in terms of the educational attainment level of young people (a 21st place within the EU27). Also when looking at the sub indicators, such as the spending on human resources and the percentage of people who leave school before having completed their curriculum, the Dutch performance is mediocre at best. Only when it comes to life long learning, the Dutch educational system seems to perform rather well in an international comparative perspective.

The figures 1-4 give a historical overview of the last ten years. This enables us to monitor if, based on the historical trends displayed in these figures, the policy targets are likely to be realised or not. It seems clear that in case the increase of youth educational attainment levels will display the same growth rates as during the last ten years, the (inter) national policy targets will not be met. The graphs on the three sub indicators, which cover policy-relevant areas, reveal that

in terms of lifelong learning the Dutch are performing really well. The national target is defined at a much higher level than is done by the EU. Besides, based on the growth pattern of the last ten years it is likely that this desired level will (almost) be met in 2010. As far as the early school leavers are concerned, the picture is more gloomy.

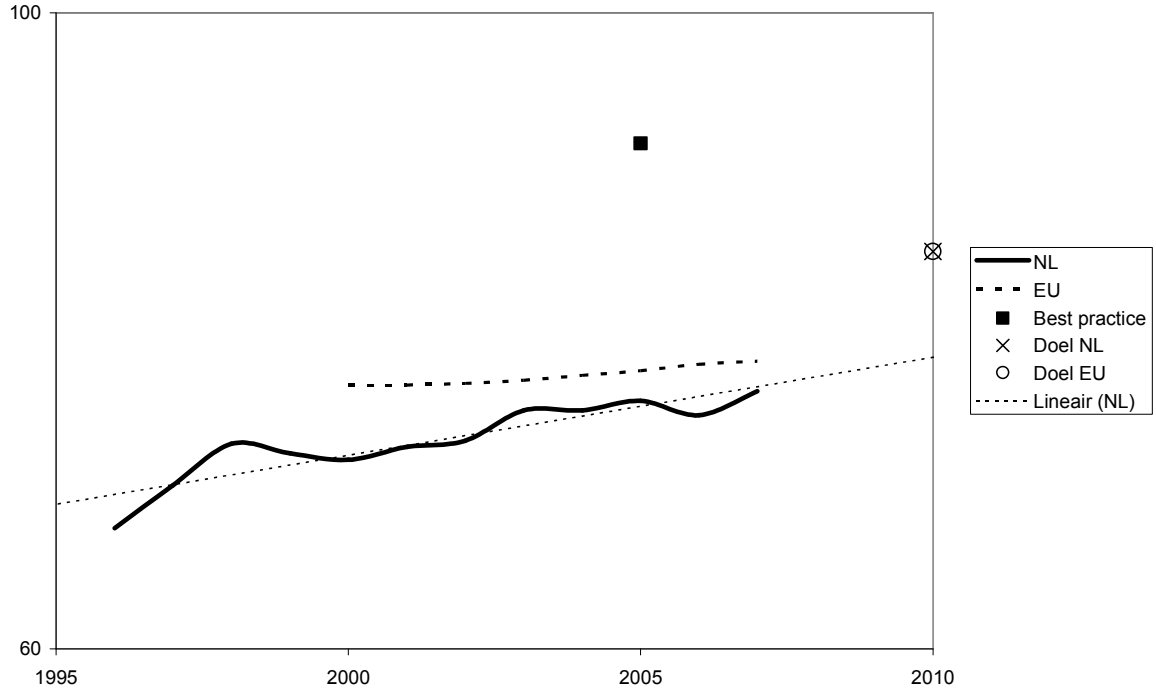

Figure 1. Youth education attainment level

Percentage of the population aged 20 to 24 having completed at least upper secondary education

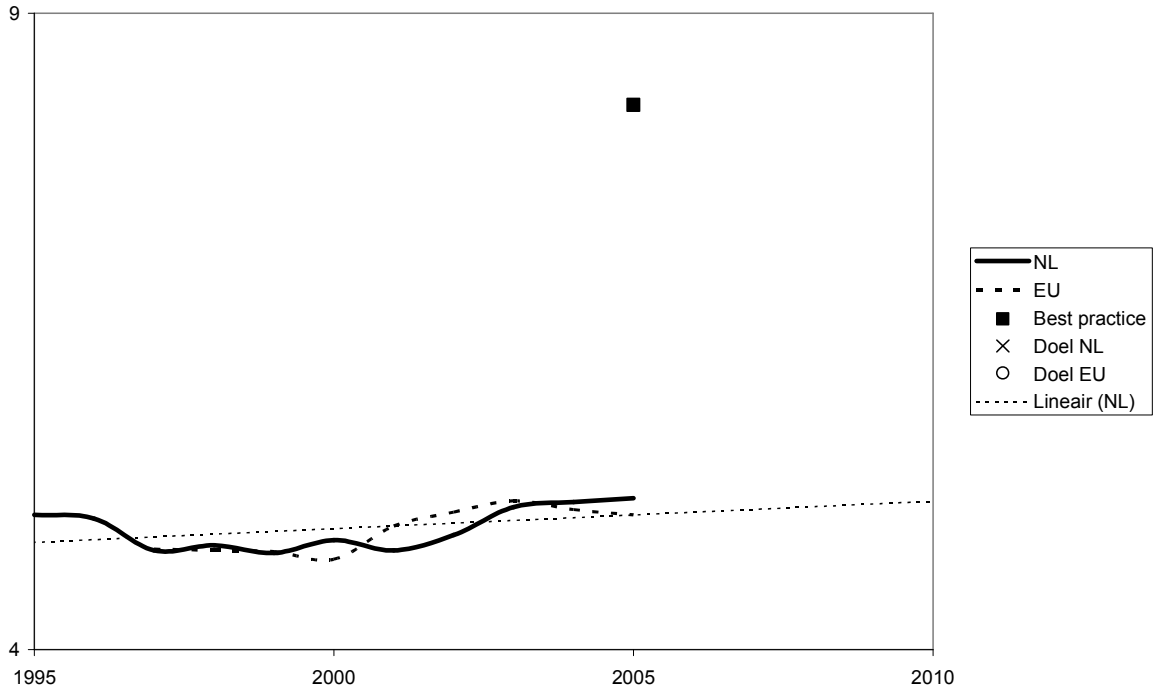

Figure 2. Spending on Human Resources

Total public expenditure on education as a percentage of GDP

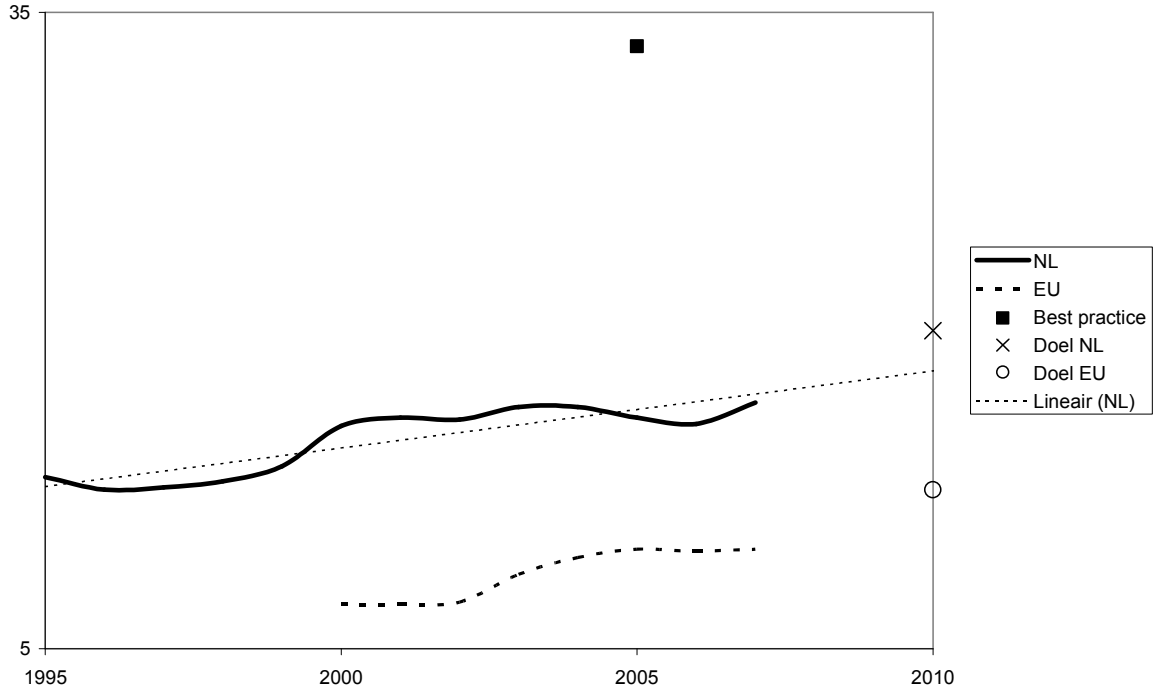

Figure 3. Life long learning

Percentage of the population aged 25-64 participating in education and training over the four weeks prior to the survey

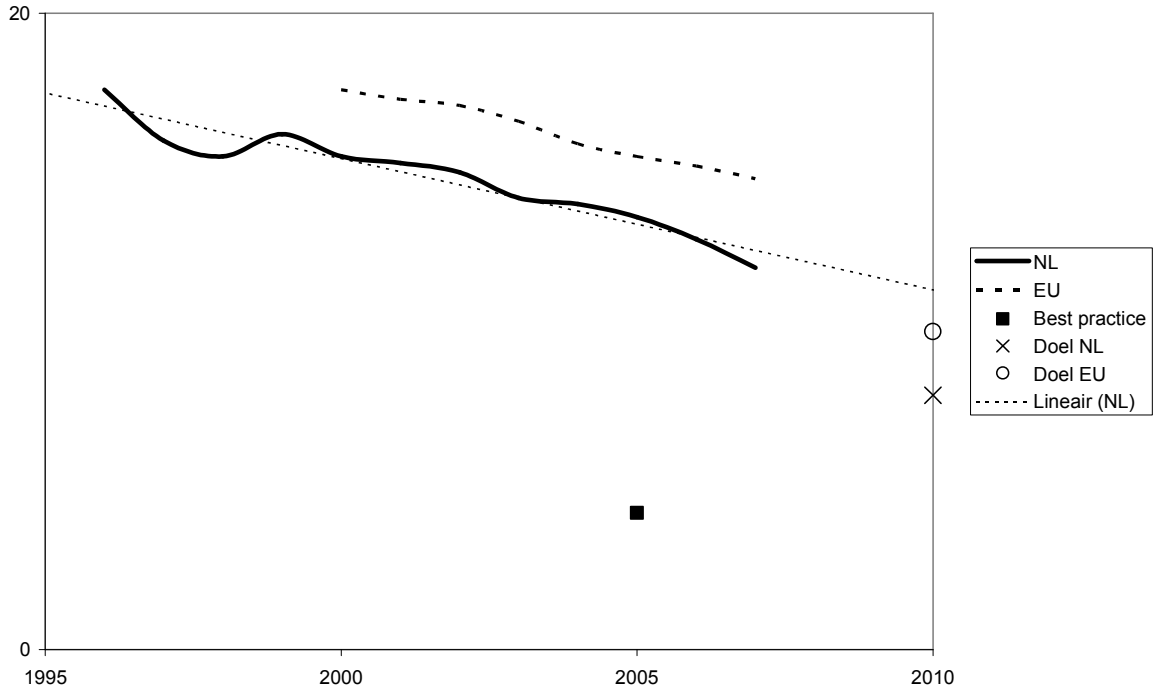

Figure 4. Early school-leavers

Percentage of the population aged 18-24 with at most lower secondary education and not in further education or training

For the other eight themes the data on headline- (capital) and sub indicators will be presented in a similar way. Even though not all aspects of sustainability are covered, this rather limited list of indicators covers the main areas of economic, human, natural and social capital. Besides, the most important policy related indicators (which are among others part of the Lisbon Agenda) are part of the data set.

5. Towards an accounting system

Clearly the themes and sub indicators that were identified in section 4 can nearly all be constructed within the National Accounting framework. In practice, however, we have found that national accounts indicators have made little impact on policy makers in the Netherlands. Germany and Sweden are good examples of countries in which national accounts indicators are used for policy purposes (Federal Statistical Office 2007 and Statistics Sweden 2008).

Nevertheless the satellites accounts can actually be very useful for policy makers because they provide a consistent basis to compare economic and other indicators which will enable us to analyse the extent to which economic, social and ecological processes are interdependent. An additional and important benefit is that the modules can be linked to input-output table which makes modelling possible (Hoekstra et al, 2008). The next couple of years steps will be taken at Statistics Netherlands to explore the possibilities of building new satellites.

In table 2 we show that all themes that have been identified in section 4 can potentially be disaggregated into the classification structure of the SNA. In this respect we have also chosen to further split the household sector into subdivision such as age, gender, income and ethnic groups.

Table 2. Sustainability indicators by SNA category

	Institutional sectors					**Activities**
	Corporations/ Government/ NPISH/	Households (categories)				NACE 1…n
		Age	Gender	Income	Ethnicity	
Knowledge Capital	X					X
Fixed Capital	X					X
Labour quantity	X	X	X	X	X	X
Labour quality-Education		X	X	X	X	X
Labour quality-Health		X	X	X	X	X
Participation		X	X	X	X	
Trust		X	X	X	X	
Climate and energy	X	X	X	X	X	X
Biodiversity and Nature	X					X

However a broader set of satellite accounts can go further than the table provided above. Table 3 shows an example of a "trust module" where the trust of citizens (sector households) in the other institutional sectors are displayed.

Table 3. Household trust module

% of citizens which trust	Age	Gender	Income	Ethnicity
Other citizens (households) -age -income -ethnicity				
Corporations				
Government				

A second example is the "knowledge networks module" shown in Table 4. These networks can also be viewed from a social capital perspective (Smits 2007). They are clearly based on trust relationships and very important for economic prosperity. Table 3 might be filled with data from the European CIS survey.

Table 4. Knowledge networks module

% of corporations which say they cooperate in knowledge networks	NACE 1	…	NACE n
With other corporations			
With universities			

In the system of modules for sustainability a time use module may also be important. The reason is that for human and social capital one of the most important "investments" that are made is time.[9]

[9] For interesting theoretical insights regarding time use, see Kooreman and Kapteijn (1987) and Hamermesh and Pfann (2005). Kazemier en Exel (1992) and Gringhuis and Van Rooijen-Horsten (2002) give examples of time-use models for the Netherlands.

Table 5. Time use module

Time spent on	Age	Gender	Income	Ethnicity
Human capital -work -formal education -on-the-job-training				
Social capital -family -friends				
Other activities				
Total time				

6. Concluding remarks

This paper has shown that capital theory is solidly based in economic thinking and that the "newer" additions to capital theory, i.e. human and social capital, are similar to the original concepts. The prospect of a system of satellite accounts for sustainability is therefore a valid, yet challenging, issue.

Economic and natural capital are the most advanced forms of capital in the statistical system. The ways of measuring economic capital (fixed capital and R&D capital) have the longest history. The practices are laid down in handbooks such as the SNA and the OECD (2001) manual of "Measuring Capital". The System of Environmental and Economic Accounting (SEEA 2003) provides asset accounts for natural capital.

The main issue which will need to be resolved is the broadening of the scope of the ownership of the assets. Interestingly, the SEEA also adopts a broader asset boundary than the SNA because ecosystems, for example, are not owned in the same sense as machines and buildings.

Introducing human capital to the National Accounts is probably an easier task than the integration of social capital, because many aspects of the core of the National Accounts already deal with labour. A fruitful first step is to see whether monetarisation as described in Jorgenson and Fraumeni (1995) and Aulin (2004) could perhaps provide useful ways of valuing this capital stock.

Perhaps the greatest challenge for sustainability is to integrate social capital, which reflects the quality of interpersonal relationships, in an SNA framework. Following ideas expressed in sociological as well as economic literature, we operationalise social capital in terms of social participation/ network creation and generalised trust.

In our attempt to quantify sustainability from a capital perspective, we use two different approaches. First we build an indicator set which is strongly policy oriented. For nine important themes covering a wide range of economic, social and ecological areas, we develop headline indicators which give us information on the development of these different capital stocks from the 1950s onwards. In case that the amount of capital per inhabitant decreases over longer periods of time, a trend can be characterised as not sustainable. The underlying sub indicators for each of the nine themes give us information on those areas on which governments can focus their policies in order to reverse such trends. By concentrating on 'flow' variables, especially those for which national or even international targets have been defined, we can give policy makers important tools to monitor the effectiveness of policy. Especially due to the incorporation of targets as well as the ranking of the Netherlands on the EU 27 list, the relative strength and weakness of Dutch society in terms of its sustainability can be charted.

However, the dashboard described above presents the main trends in rather one-dimensional terms. It is important to have information on the breakdown of several of the capital forms by institutional sector, household category or industry. Satellite accounts for a wide range of sustainability indicators will enable us to analyse the interdependence of economic, social and ecological processes much more rigorously than can be done now.

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