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Measuring Quality of Life in Rural Europe — A Review of Conceptual Foundations

Abstract

Quality of life is an important element in the sustainable development of regions, and many policies aim to improve the quality of life of the inhabitants. However, it is still disputed how to conceptualise quality of life and in particular how to measure it. This paper gives a concise overview of the literature concerning the measurement of quality of life by focussing on the theoretical foundations of quantitative approaches and their applicability to rural regions in the European Union. In particular the paper highlights advantages and disadvantages of individual approaches concerning their theoretical foundations and the availability of the components considered. It also discusses methodologies used for aggregation and weighting. Following from this, we explore whether and how a robust quality of life index on a regional level could be constructed.

Introduction

Quality of life (QoL) is an important element in the sustainable development of regions, and many policies aim to improve the QoL of the inhabitants. For rural regions, this notion is important for at least two reasons. Firstly, it responds to the explicit policy goal that rural regions in Europe are to be kept as

areas where people should live. Thus, the fine-tuning of policies requires exploring the differences between rural regions and agglomerations. And secondly, QoL is useful to explore different development paths of rural regions, which so far only rely on the argument of differential growth.

In recent years, there has been a surge of interest in alternative measures of well-being. In the literature (see Sirgy, et al. 2006 for an overview in different disciplines) and more recently also in the policy arena (Bergheim 2006 for the Deutsche Bank; and Boarini, et al. 2006 for the OECD; e.g. Sustainable Development Commission 2003 for the UK government), ways to conceptualise and measure QoL are much debated.

Most prominently, the analysis of QoL is connected with economists' interpretation of the utility concept. After classical economists implicitly assumed that utility could be measured cardinally, new welfare economics settled from the 1930s onwards on an ordinal utility concept focussing on relative ranking and revealed preferences. This opposition of economists against the cardinal measurement of utility has weakened recently. A rapidly growing body of literature has emerged over the last two decades criticising the dominant utility concept because (i) the 'narrow' definition of utility in new welfare economics has limited explanatory power, (ii) modern psychology justifies measuring utility directly, and (iii) policy recommendations based on the new welfarist approach mostly ignored distributional issues, non-traded activities in society, and environmental benefits and costs, which were increasingly recognised to influence well-being.

On the practical side, indicators for measuring well-being are often explicitly not theoretical, resulting in indicators chosen intuitively and/or for ease of availability. Hence, these indicators often double-count or leave out one or more domains of well-being. At the same time, theoretically derived indicators normally suffer from unavailability of data, because monitoring systems have not yet been established or these variables are hard to measure per se.

The aim of this paper is to review novel theoretical approaches to measure well-being/quality-of-life[1], and examine their applicability for monitoring purposes for the development of well-being in European rural areas. In particular the paper highlights advantages and disadvantages of individual approaches concerning their theoretical foundations and the availability of the

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[1] Please note that economists sometimes distinguish the term welfare, referring to the total well-being of a community (it often has also an explicitly materialistic — connotation), from well-being, which relates more to the individual's state of being, frequently also described as quality of life. We will not make these distinctions but use the terms interchangeably.

components considered. It also discusses methodologies used for aggregation, weighting, and how trade-offs between components are treated. Following from this, we explore whether and how a robust QoL index could be constructed, suggesting a list of domains that should ideally be considered in a QoL measurement tool.

Approaches to Measure Quality of Life

WELFARE APPROACH

Welfare theory is based on the notion of utility. Rational individuals maximise their utility through an optimal combination of goods bought from their income. Gross domestic product (GDP), the best known composite indicator of income, was of course not devised to measure welfare per se, but has often been interpreted as such.

Another line of criticism of welfare theory focuses on the maximisation hypothesis of utility, which is argued to constitute the exception rather than the norm of an individual's choice (Frey and Stutzer 2002; Kahneman and Krueger 2006; Layard 2006; see also the literature on 'bounded rationality' and 'satisficing'). When trying to scale up from the individual to the societal level, the measurement of welfare causes severe problems. Aggregation would work only if a nation could be perceived as one person (Sen 1979). Hence, also narrow utilitarians do not equate more GDP with more welfare.

Economists' initial reaction to such criticisms in the 1970s and 1980s was to develop GDP in the direction of a real welfare measure. Taking GDP as the starting point, adjustments for societal 'goods' and 'bads' were made. The *Measure of Economic Welfare (MEW)* by Nordhaus and Tobin (1973) rearranged GDP categories to adjust for welfare reducing regrettables (commuting, defence, road maintenance, environmental costs, and disamenities of urban life) and the welfare-enhancing effects of household production and leisure time. This was developed further by Daly and Cobb (1989) to the *Index of Sustainable Economic Welfare (ISEW)* and later the *Genuine Progress Indicator (GPI)*. One frequently used version is the *Index of Economic Well-being (IEWB)* (Osberg 1995; Osberg and Sharpe 2002; Osberg and Sharpe 2005); similar to GDP it aims to capture command over resources, but extends beyond it to encompass several dimensions of economic well-being. The IEWB differentiates between welfare for current generations (flow of consumption) and future generations (stocks), and adjusts for current income inequality and for the extent of security of future

income flows. These four dimensions of well-being aim to capture "trends in average outcomes and in the diversity of outcomes, both now and in the future" (Osberg and Sharpe 2005: 314).

More specifically, the four basic domains are —

- Effective per capita consumption flows: Includes consumption of marketed goods and services like GDP, but adds government services, value of unpaid work, the underground economy, effective per capita flows of household production, leisure, economies of scale in consumption due to changes in family size, and changes in life expectancy. It deducts regrettables like costs of commuting, pollution abatement, car accidents, crime, and changes in working time.
- Net societal accumulation of stocks of productive resources (= sustainability domain): Includes net accumulation of tangible capital, housing stocks, R&D investment, net changes in the value of natural resources stocks, environmental costs due to CO_2 emissions, net changes in the level of foreign indebtedness, and net accumulation of human capital.
- Income distribution: Intensity of poverty (incidence and depth) and the inequality of income.
- Economic security: Financial implications from unemployment, illness, family break-up, and poverty in old age.

These dimensions are related additively:

Economic well-being index = effective per capita consumption flows + net accumulation of stocks of productive resources for future generations + income distribution (poverty and inequality of current generations) + insecurity of income flows.

Osberg and Sharpe (2005) argue that weights should be assigned through a democratic process. Only the non-priced sub-dimensions of the domains — income distribution and insecurity — are weighted by experts for technical reasons. The former is weighted along the Rawlsian perspective which gives greater importance to poverty over inequality, and economic security is weighted by the relative importance of the population share at risk. The IEWB uses the linear scaling technique for constructing the composite index (Salzman 2003).

Making adjustments to traditional indices often entails problems of data availability: The assessment of home production, defensive expenditure and environmental damages being the case in point. But, as Boarini et al. (2006: 26) argued in a recent OECD study: "While measuring these items is hard and inevitably controversial, ignoring them may lead to misleading conclusions if they vary over time and across countries". Rather than shying away from dimensions of well-being that are difficult to measure, this paper supports the

path of improving the conceptual foundations of indices and ultimately enhance complementary data gathering.

Beyond these and similar composite indicators accounting for welfare measurement from an economic viewpoint, social indices have also been developed over the last four decades. Classic examples are life expectancy or participation in secondary education. Quality-adjusted life years (years remaining until death, corrected for the quality of health), the Physical Quality of Life Index (mortality, literacy, life expectancy at age one), and the Index of Social Progress (composed of 36 indicators) are examples of more complex indices, which have been applied over recent years with some success.

CAPITAL APPROACH

A further development of the system of national accounts, the *net national product* (NNP) comprises an economy's consumption and net investments into manufactured capital, human capital, and natural capital which seems like a considerable broadening of the conceptual space. Dasgupta (2004) criticises NNP on the grounds that assumptions of linearity of well-being and constant accounting prices over time are not tenable. That makes NNP grow for some time while in reality, the country becomes poorer. Dasgupta argues that it is hard to measure well-being directly as it would require estimating non-linear functions of observable quantities (see also discussion in the next chapter) and therefore uses the next best option, which is to find more convenient measurable indicators that have a significant linear relationship with well-being. Dasgupta suggests that his measure of social wealth does exactly that, and that it is also true for the social rate of return of investment projects, the 'present discounted value of the flow of net social profits'. Mirroring the theoretical sub-domains for citizenship (socio-economic, political, and civil), current social wealth is measured as:

GNP/capita = average private consumption/capita + average life expectancy at birth (years) + adult literacy rate (%) + rights to political liberty (1−7) + civil rights (1−7).

Wealth available for current and future generations is measured with genuine investment to denote change in society's wealth. It is designed to cover flows and assets of human capital (knowledge, skills, health), manufactured capital (buildings, machinery, roads), and natural capital (ecosystems, minerals, fossil fuels). It contrasts with net domestic investment of traditional economics. Manufactured capital is estimated by net national saving, human capital by expenditure on education, natural capital by net changes in the stock of

commercial forests, oil and minerals, and CO_2 emissions. After accounting for population change and technological change, it was found that genuine investment is negative in large areas on the African continent and the Middle East, and positive in Europe, North America, and central Asian states (Arrow, et al. 2004).

Institutions (legal structure, formal and informal markets, government, civil society including its interpersonal networks, rules and norms) are not included as a separate (social) capital category, but instead they are seen to guide the allocation of capital assets and flows.

DIRECT MEASUREMENT OF WELL-BEING

Easterlin (1974) revealed that despite rising incomes in 'developed' countries, the level of satisfaction of people with their lives stays more or less constant. There are diminishing returns to income; at least once a certain threshold level is passed. The 'Easterlin Paradox' triggered new research into measuring utility directly, which contrasts the sole reliance on revealed preferences.

Frey and Stutzer (2002) identify five sets of determinants of life satisfaction: Personality factors (e.g. self-esteem, personal control, optimism); socio-demographic factors (e.g. age, gender, marital status, education), micro- and macroeconomic factors (individual and aggregate income, unemployment, inflation); contextual and situational factors (employment and working conditions, work-related stress, interpersonal relations, living conditions, health); and finally institutional conditions and perceived governance structures (extent of political decentralisation including direct political participation rights). Variables from all these areas have proven to contribute to general happiness, although personality factors are more often investigated by psychologists. A useful summary of much of this research is given by Dolan, et al. (2006).

The 'Leyden School' (e.g. Van Praag and Ferrer-i-Carbonell 2004) developed a two- to three-layer satisfaction aggregation model in which they distinguish between different domain levels. Objective variables (like gender, age and income) contribute to domain satisfaction levels (satisfaction with job, finances, housing, helth, leisure, marriage, social life, environment, politics), which in turn contribute to general life satisfaction. The authors argue that these satisfaction domains are similarly structured, but represent different dimensions contributing to general life satisfaction. These domain levels can then be used like observed numerical variables in econometric one- and multiple-equation models.

Helliwell (2006) proposes a novel approach for taking into account the institutional/political environment as well as social capital. Both of these dimensions had already been proven before to influence the QoL of individuals. The measurement of social capital variables is based on the insights of numerous studies that frequency and quality of contacts and its associated trust influence life satisfaction even more than financial income once a threshold to meet one's basic needs is surpassed. For example, Helliwell and Putnam (2004) emphasise that social capital is strongly linked to subjective well-being in many ways whereby marriage, ties to friends, neighbours, and at the workplace are of capital importance and contribute to a climate of trust. They argue that all these variables, plus civic engagement, are independently and robustly related to life satisfaction, either directly or through their impact on health. The sub-indices to incorporate the influence of institutions are based on World Bank data (Kaufmann, et al. 2003). Results confirm the hypothesised relationships: social trust and the institutional environment show a decisive impact over and above other variable.

The Economist Intelligence Unit (2005) also proposed a QoL index based on a regression of secondary data on stated life satisfaction as a dependent variable to arrive at rankings for 111 countries. The beta weights of coefficients are used to derive weights for the explanatory variables explaining QoL to derive an 'objective' index. Of the factors shown to be associated with QoL, nine explanatory variables finally remain in the equation after regression tests. They explain more that 80% of the inter-country variance. Multiple regression revealed that most weight is given to health, material well-being, community life, family relations, political stability and security, climate and job security in descending order. Political freedom and especially gender equality feature with less importance. Further variables like education levels, GDP growth and income inequality (Gini coefficient) are reported to be insignificant. Education levels were also found to be of various importance in other studies, but it is somewhat surprising for income inequality. For example, Di Tella and MacCulloch (2006) highlight that income inequality affects different parts of populations in Europe and the US. They hypothesise that perceptions of mobility might influence whether people feel affected by inequality even if they are poor.

OPPOSITES TO QUALITY OF LIFE ENHANCEMENT

Instead of well-being a recent line of research focuses on *ill-being* and its determinants. Kahneman and Krueger (2006) suggest this (i) for theoretical reasons because prospect theory tells us that potential losses influence people's

decision more than potential gains; and (ii) for political reasons because it might be easier to agree on detrimental welfare effects than on welfare enhancing ones. Such measures of ill-being could, for example, be life expectation, material deprivation, prevalence of crime, severity of punishment, ethnic, social and political exclusion, family structure and break down, mental health, suicide, morbidity, education, quality of working life, job security, access to health care, urban congestion and sprawl, environmental quality (in neighbourhood), quality of personal and social interaction.

In parallel to the above work, a family of 'opposite' measures to good QoL has emerged, which refers mostly to disadvantage, deprivation, poverty and exclusion. It is a way of defining QoL as 'not being unhappy'. A body of literature developed on measures of rural disadvantage (e.g. Index of Rural Deprivation, Rural Discrimination), which raise additional aspects of QoL not addressed in more generic indices. They improve our understanding of exclusion and deprivation (e.g. mobility and opportunity deprivation), which may occur in rural areas when uneven distribution of public service provision combines with poor accessibility to services such as health, education and retail facilities. In a policy context, measures of rural disadvantage are used to facilitate the spatial targeting of resources to areaswhich are most in need and may also be used to identify subgroups of the population who are most at risk of experiencing poverty.

The nature and extent of deprivation in rural areas was first analysed by Walker (1978) and Shaw (1979). Dunn, et al. (1998) distinguished disadvantage indices which were developed for a specific policy objective such as education or health, and those which identify overall disadvantage. Examples of rural disadvantage indicators include: (i) percentage of households with an income of less than 60% of the median, (ii) percentage of households living within 2 km from a primary school, (iii) percentage of households living within 4 km from a doctor's surgery, etc. More examples are discussed in Dunn, et al. (1998) and Harrop and Palmer (2002).

In response to limitations of single indicators, Dunn, et al. (1998) proposed the method of indicator 'bundles'. This method aimed to identify the number of people of households exposed to, or responding to, a specific set of circumstances. Eight such 'bundles' were identified: (i) access to employment; (ii) quality of employment; (iii) vulnerability of employment in the local economy; (iv) housing access and affordability; (v) housing quality; (vi) low incomes; (vii) access to services; and (viii) physical isolation. Public insitutions like the Countryside Agency in Great Britain integrated indicators of rural disadvantage into their policy making frame (Countryside Agency 2003). The report identifies

12 indicators, subsumed under the five themes: income and financial, employment, educational, health and housing disadvantage.

MIGRATION

Migration rates are another approach used to measure absolute and relative QoL and living standards across regions. In such studies the decision of a household to migrate is treated as maximising one's QoL.

Individuals choose to migrate from one area to another if there are positive net benefits over time from doing so (Cebula and Vedder 1973). Benefits of migration can be physical and psychic advantages and costs can be direct current and future costs of moving, alternative costs (forgone earnings while in transit), and psychic costs. Another early study, Liu (1974), attempted to explain the decision to migrate based on the assumption that the probability of moving is determined primarily by the probability of getting and being able to enjoy a better QoL. The decision to migrate was assumed to be made only if the total well-being reflected by the sum of the existing and expected QoL is better somewhere else than what the person can obtain at their present location, after taking into account all opportunity costs associated with the move.

The standard method used since then has been the hedonic approach (Rosen 1979), which estimates the compensation differentials that people are willing to pay for differences in amenities. This is based on the assumption of a long run Tiebout (1956) type of 'voting with your feet' equilibrium in which people are optimally allocated, implying that the standard of living is equivalent across locations. Any differences in QoL across regions are compensated by income differences, which in turn provide a direct measure of the value of a location's QoL in terms of the income that people are willing to forgo. Criticisms of this approach focused mainly on the assumption of long run equilibrium (i.e. standard of living equivalence).

Another group of studies was initiated by Greenwood, et al. (1991) who proposed a method which relaxed the assumption of long run equilibrium and proposed a straightforward method for using migration rates to estimate QoL. Instead of migration between regions, Greenwood et al. focused on migration between a region and the rest of the country, which they labelled 'net gross migration' (total migration from a region to the rest of the country net of total migration from the rest of the country to the region). When a region is in a long run equilibrium, it has the same standard of living as the rest of the country and hence a zero net gross migration. Thus, the relationship between the regional net gross migration rates and per capita income relative to the national average

are calculated, and this is used to calculate the level of income that would be necessary for a region to have zero net gross migration. The difference between this calculated regional income level and the actual national per capita income is the region's QoL in value terms. This approach was later improved by using gross migration rates (i.e. the ratio of net migration over the sum of in- and out-migration) as a more accurate measure.

Another improvement of the hedonic pricing literature was introduced by Wall (2001). This study took account of past conceptual problems by (i) treating labour market conditions separately from other amenities, (ii) relaxing the assumption that moving costs between two locations are independent of the direction of the move, and (iii) controlling for the effects of migration between neighbouring regions. He took net cross-migration instead of gross (one — way) migration by netting out structural problems such as distance and the effect of alternative location options. OLS regression was applied to each pair of regions where the dependent variable was net cross-migration in terms of migration opportunities.

CAPABILITY APPROACH

Sen's (1993; 19985) *capability aroach* (CA) represents a framework covering a comprehensive conceptual space to assess social welfare by respecting not only the economic, but also the social, political and cultural dimensions of well-being. Thus, the focus of Sen is how to integrate non-market goods in an individual's resource constraints; this needs to be seen against the background that individuals can reach a similar level of well-being from different income levels (Kuklys 2005).

The CA distinguishes between functionings and capabilities. Functionings are defined as achievements (what a person is and does in life), which is an outcome-based well-being measure in contrast to resource-based measures more commonly used. A person's set of *capabilities* is the ability/opportunity/freedom to choose from various combinations of functionings.

Capabilities are the more relevant focus for analysis because we can ask here which potential functionings the individual can choose from. It is of less importance which set of functionings they finally chose to fulfil their way of living, except in policy evaluations where for instance restricted data availability might suggest their inclusion as a second best alternative. It also follows that the main policy goal should be to focus on enhancing the choice set available to people, i.e. increase or maintain capabilities because they describe what people can do. The following schema illustrates the distinction between the means and the ends of achievement.
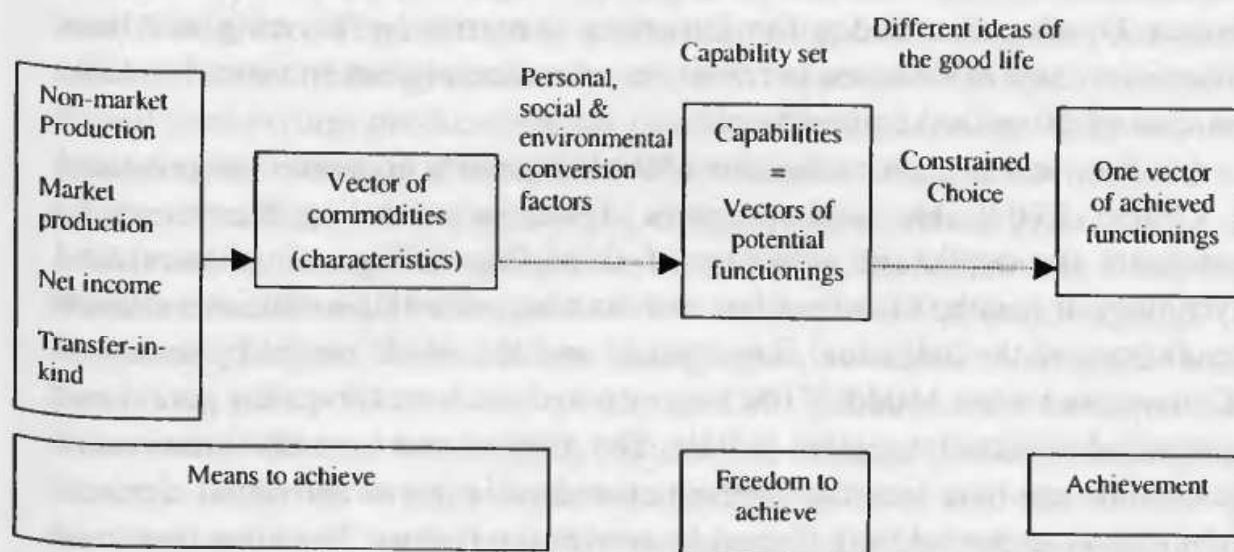
Fig. 1. The distinction between commodities and functionings in the capability approach
Source: (Robeyns 2003)

Sen refrains to endorse a universal list of capabilities or valuable functions that would describe a 'good life'. The selection of capabilities depends on the purpose of the evaluation and the geographical area it is applied to. This deliberate underspecification is why the CA approach has been applied so far in very different contexts, spanning from empirical evaluations of local policies to abstract theoretical work in e.g. political philosophy. A critical stance to this openness is held by Nussbaum (2003) from a moral/legal/political philosophy viewpoint who suggests that Sen's loose 'perspective of freedom' needs to be made more specific because different kinds of freedom have different implications, i.e. on a continuum of important — unimportant, or good — bad; they can conflict with each other.

The *Human Development Index* (HDI) of the United Nations is based on Sen's approach, in which health, education and access to resources are seen as the basic functionings to enhance peoples' choices. Although being a very successful composite indicator, a widespread criticism of the HDI is that it is still rather crude and an additional measure of inequality is missing, thus countries still appear to do well even if considerable parts of the population are left out. Also the social and the environmental domains are missing, although it is well documented that they have an impact on well-being. Recent explorations aimed to revise the HDI to include inequality (see Foster, et al. 2005), which showed sizeable re-rankings. A proposal to include the environmental dimension

was devised by Constantini and Monni (2005), who propose a Sustainable Human Development Index for European countries by covering the basic dimensions sustainable access to resources, education attainment, social stability and quality of natural environment.

Another recent operationalisation of Sen's capability approach was presented by Grasso (2002). He used a system dynamics modelling framework to investigate the depth and structure of three functionings: (i) physical and psychological health, (ii) education and training, and (iii) social interactions. Simulations of the individual functionings and the whole model by means of a Conversion Factor Model (CFM) were carried out for a three year period and for three administrative regions in Italy. The purpose was to verify variations of the functionings over time due to the assumed variation of individual elements of the system (commodities), filtered by conversion factors. The main benefit of this kind of modelling is the ability to integrate various interrelationships within (and between) systems, capturing interactions that often escape more traditional, static analyses. The results are consistent with previous findings on QoL in the investigated regions, and they are in line with Sen's view that commodities and incomes are only material bases for well-being, the latter being dependent on a number of personal and social circumstances.

Approaches Originating from the Sustainable Development Discussion

Nature is the very basis of our social and economic being. Hence, sustainability of resource use needs to be reflected in deliberations about QoL. From the wide range of suggestions, the following four approaches are in our view conceptually most promising.

The *Millennium Ecosystem Assessment* (2005) defines human well-being to cover five basic dimensions (basic material needs for a good life, health, security, good social relations, freedom of choice and action), which resemble proposals that we surveyed above (esp. Dasgupta and Sen). Ecosystem services underpin all human well-being factors. "The relationship between ecosystem services and human well-being is mediated by access to manufactured capital, human and social capital" (ibid: 49) including technology and institutions. Measurement is problematic because relationships between ecosystem services and human well-being are not linear. Changes in case of high levels of ecosystem services might not influence well-being much, but when it comes close to thresholds, human well-being can be influenced over-proportionally, if not

withdraw the very basis of any well-being in the extreme case (desertification of land, floods, etc.). This reflects the critical capital approach. Including ecosystem services (harvest of energy and forests, etc.) into capital assets in the calculation of net national savings produces similar results to Dasgupta's: especially resource dependent economies in Africa, South America and Asia produce negative net savings, sometimes while experiencing considerable economic growth.

Beyond human well-being and ecosystem services, the Millennium Ecosystem Assessment differentiates between direct and indirect drivers of change on ecosystems. Indirect drivers being demographic, economic (changes in trade flows and policy frameworks, partly due to globalisation), socio-political (governance and legal framework), cultural and religious (beliefs, consumption choices). Direct drivers are defined as changes in local land use and cover, species introduction or removal, technology adaptation and use, external inputs (fertilizer use, pest control, irrigation), harvest and resource consumption, climate change, natural, physical, and biological drivers (very long-term).

The *Handbook on the System of Integrated Environmental and Economic Accounting (SEEA)* published by five major international organisations (United Nations 2003) also implements a critical capital view of asset accounting based on the notion of intergenerational equity, which requires wealth/well-being per capita not to decline over time. Critical capital is seen as non-substitutional against human-made capital, whereas other capital is allowed to be substituted against human-made capital (to a certain extent) without incurring high risks of reducing wealth. It uses physical accounts to monitor critical capital along the strong sustainability view (e.g. water resources, land (use), soil resources, terrestrial and aquatic ecosystems, atmospheric systems) and monetary accounts to monitor all other resources along the weak sustainability view (e.g. land underlying buildings and structures, mineral resources). No accepted measures for human or social capital are included in SEEA, which, together with some omitted environment categories due to measurement problems, could bias total wealth in any direction.

Prescott-Allen (2001) constructed a comprehensive measure of well-being with which he can monitor the progress of human and ecosystem well-being and compare results between countries. He postulates that *human well-being* consists of the five dimensions (i) long life in good health and a stable population base; (ii) wealth to secure basic needs and livelihoods as well as to promote enterprise and prosperity; (iii) knowledge to live sustainably and fulfil potential as well as a vibrant culture; (iv) a community that upholds the freedom of members, has an open and clean government, and which is safe from violence and crime; (v) benefits that are shared equally by males and females and shared equitably

among all strata of society. *Ecosystem well-being* has the five dimensions (i) conserving the diversity and quality of the natural land ecosystem; (ii) conserving the diversity and quality of water ecosystems; (iii) restoring the chemical balance of global atmosphere and the quality of local air; (iv) maintaining all wild species and the genes in domesticated species; (v) keeping resource use within the carrying capacity of ecosystems. On this basis, Prescott-Allen developed four indices, which together form an overall assessment of QoL, where human and ecosystem well-being are weighted equally. A human well-being index and a separate ecosystem well-being index are based on the above criteria and are constructed from a relatively large set of indicators. The well-being index combines the two indices to measure sustainability overall. And the well-being/stress index captures how an individual country influences the global ecosystem.

The *scorecard approach by the UK Department for Environment, Forestry and Rural Affairs (DEFRA)* represents one of the more advanced proposals for sustainable development indicators on different scales, derived from national policy priorities, focus groups and surveys[2]. A set of nested indicators are developed at several levels: 68 national indicators are embedded in the UK Government Sustainable Development Strategy, of which 20 indicators make up the core framework indicators to give an 'overview of sustainable development and highlight priority areas shared across the UK'. 44 out of the 68 indicators were also calculated for regional levels to compare progress between regions, quantitatively in data sheets and qualitatively in accompanying fact sheets. Complementary to this, an update of the local quality of life indicator set was published by the Audit Commission (2005) consisting of 45 indicators covering revealed and stated preferences as well for use by local authorities. As is usually the case when it comes to the local level, participatory approaches going beyond involving a restricted stakeholder community were implemented to establish the link between national policy priorities and local needs. No aggregation to a composite indicator on the national level is attempted.

There exists a plethora of local sustainability indicator frameworks which were developed in a participatory manner to make them meaningful for the respective location, and which are mostly qualitative in nature. The International Institute for Sustainable Development holds an online compendium to facilitate learning between interested locations, currently holding 690 references[3].

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[2] http://www.sustainable-develoment.gov.uk/progress/index.htm; and http://ww2.audit-commission.gov.uk/pis/quality-of-life-indicators_02.shtml (accessed 20.10.2006)

[3] http://www.iisd.org/measure/compendium/searchinitiatives.aspx (accessed 20/11//2006)

Discussion

After this concise overview of competing theoretical foundations for measuring QoL, we discuss the following advantages and disadvantages of these approaches along the headings (i) theoretical foundations and (ii) methods applied.

WELFARE THEORY

The main advantage of approaches relying on indirect measurement of QoL is that they are usually well grounded in welfare theory. Longstanding research into revealed preferences has generated a relatively consistent body of literature. The downside is that parts of this theoretical construct cannot be tested empirically because preferences are hard to observe. The researcher mostly decides on methods for aggregation and weighting. Thus, the reliability of such indices is sensitive to the researcher's mental predisposition and skills. This can be perceived both as an advantage and disadvantage. Those who see this as a disadvantage propose that these methods involve subjective value judgements of the researchers on e.g. selection of indicators, choice of aggregation and weighting method, and technical parameters (e.g. number of factors, choice of tests) that should better be avoided. Those who perceive this as an advantage do not trust that respondents to a survey come up with reliable values due to respondents' misjudgements or potential problems associated with operational survey implementation.

In recent years, advancements in weighting and aggregation also had the effect of making pros and cons of different methods more explicit (Nardo, et al. 2005; OECD 2002 give overviews). However, some criticism still holds: (i) analysts can manipulate weights, (ii) weights may not be transferable from one (geographic) area to another, (iii) different normalisations of scores can give different weights, and (iv) weights can become inconsistent when a large number of indicators are analysed.

DIRECT MEASUREMENT OF QoL

The main advantage of direct measurement is that it catches people's stated preferences, so it does not require value judgements by the analyst because the evaluation of the scope and aggregation of the various dimensions of well-being is performed by the responder in arriving at his or her stated well-being. Thus, it holds the promise to tap directly into the well-being domain.

Although some theoretical and methodological challenges still remain to be addressed, this approach allows posing new questions compared with the revealed preferences approach, and old questions can be revisited and cross-checked for consistency of conclusions. For instance, it enables researchers to investigate not only the relative contribution of outcomes, but also of procedural utility. Specific recommendations emerging from the literature tend to emphasise relative status, adaptation over time, personal and social relationships, work/life balance, participation in communities and political life to be important beyond immediate material sufficiency.

Appropriate research design lessens biases for social desirability, question order, response scales, situational mood, etc.; Frey and Stutzer (2002) discuss these issues in detail.

Overall, the evidence to date indicates that self-reports of happiness/life satisfaction are statistically valid (especially high internal reliability for multiple-item scales (happiness) and cognitive aspects of happiness (life satisfaction), temporal stability and convergence with non-self-report measures of well-being).

Theoretical foundations are being built by integrating approaches and findings from psychology and economics. Causal relationships are not yet firmly established and some methodological problems remain. For some results, it is currently still possible that different conclusions could be drawn depending on the order how explanatory variables enter the model, and which variables are controlled for. There is also an issue relating to assumed linear relationships between predictor and satisfaction variables, which are not expected to hold for all variables at closer scrutiny (Dolan, et al. 2006).

Due to data constraints, practitioners sometimes resort to use a mix of secondary and survey data to estimate a composite indicator. This has the advantage that survey questions fill gaps in secondary data, which were identified by the applied theoretical framework.

CAPITAL THEORY

Dasgupta's (2004) conception of genuine investment, though a considerable advance theoretically, assumes the optimistic weak sustainability viewpoint: Increasing manufactured or human capital can in this case fully compensate for natural resource depletion. This assumption, however, is questioned by many scholars who hold the critical capital view, where some essential natural resources are seen to be non-substitutable (e.g. quality of air, water, CO_2 sinks, biodiversity). A recent application by Arrow, et al. (2004) showed that genuine

investment exceeds domestic net investment in the UK and the US because the substantial increase in human capital overcompensates the value of natural resource depletion. A literal interpretation of these results suggests the US and the UK being on a sustainable path, which seems to be at odds with what indicators show that were developed in other disciplines.

The empirical application of genuine investment is marked by some important data missing. As the authors note, many uncertainties and caveats are likely to bias the results. For example, natural capital is typically underpriced, some essential natural resources are not included in the calculations (e.g. biodiversity, soil erosion, urban pollution), neither are economic services of natural resources; and expenditure on formal education as a proxy for human capital leaves out a few dimensions that can introduce a bias in either direction. Distributional issues could also be incorporated into a further development of this approach. Another weakness is that it is hardly conceivable to apply this approach to sub-national levels due to data problems.

CAPABILITY APPROACH

The main strength of the capability approach is its focus on outcomes and opportunities, as well as the broad coverage of potential well-being functions. This is a bold step forward in comparison to what new welfare theory aimed to do. The main weakness of the capability approach is that it is still new and underdeveloped conceptually as well as empirically, although this does not prevent the main international organisations from applying it and learning from improvements as they go along. This is mostly the case because traditional, one-dimensional measures have increasingly been seen to perform poorly. The promise is that "we can begin designing institutions by asking what it would take to get citizens up to an acceptable level on all these capabilities" (Nussbaum 2003: 55).

The Human Development Index, which is based on the capability approach, is still underspecified in respect to social and environmental dimensions. It remains open whether this could be integrated by keeping the current consistency between regional and national analyses due to its simple structure. This argument is mirrored on a more general conceptual level by Ibrahim (2006), who argues that the capability approach is too much focussed on the individual level, and leaves out the collective dimension to human well-being. He suggests including collective (social capital) capabilities to increase the breadth covered in describing individual as well as collective well-being.

SUSTAINABILITY

As for indicators mainly driven by the environmental discussion, interdisciplinary learning is high on the agenda, especially when it comes to defining thresholds for critical capital items. Environmental quality over the long term is best measured by differentiating between stocks and flows. We could see (natural) stocks to contribute to the QoL of future generations, and flows to contribute to the current generation. Its obvious relevance needs to be represented somehow in a broad QoL assessment.

The conceptual framework of the Millennium Ecosystem Assessment is comprehensive and its dynamic character by including drivers of change bears high potential. But a general QoL assessment would benefit from including also dynamic interrelationships between the non-environmental capital stocks. An operationalisation to capture interrelationships ideally requires a systems approach to modelling, of which some have been developed in the recent past. It is an empirical question whether a simpler, i.e. linear model could capture the most relevant dynamic influences, but it is not to be expected. A drawback is that applicability on regional levels is currently not feasible due to restricted data availability.

Other proposals from the environment domain like SEEA or the indicator framework by the UN-CSD are important initiatives which will constitute the backbone of future monitoring of sustainable development on different scales. Particular attention should be given to embedding core indicator sets of sub-national levels into these initiatives, while allowing for regional and local additions to fit the specific needs. As an example, the UK scorecard approach of QoL/sustainable development indicators constitutes an information base of considerable breadth, of which a smaller set of indicators is calculated for regional and local levels, the latter being enriched by a complementary set of stated preference indicators.

As for **methods of analysis** used in these studies, we can broadly divide them into basic composite indicators (relatively often, they rely on equal weighting of sub-indicators), composite indicators based on econometric models (linear regressions, probits, logits, etc. with empirically derived weights) and system dynamics models.

Basic composite indicators[4] (e.g. Index of Sustainable Economic Welfare, Genuine Progress Indicator, Human Development Index)

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[4] Here we mean only those composite indicators that are not based on a model or survey.

Composite indicators are formed when individual indicators are compiled into a single index on the basis of some weights. They measure multi-dimensional concepts which cannot be captured by a single indicator alone (Nardo, et al. 2005). This is the most widely used methodology for QoL measurement, however also the most criticised one; features of their composite nature (not because of their reference to QoL) include more or less subjective weighting.

Their main advantages (Nardo, et al. 2005) come from the fact that they: (i) can summarise complex phenomena or multi-dimensional issues for policy purposes, (ii) are relatively easy to interpret (iii) can be used for ranking countries or regions, (iv) can be done systematically over time, (vi) keep reasonable size limit of the set of indicators, (vii) are quite transparent and relatively easy to understand by the broader public.

The main disadvantages of such indicators are (i) if poorly constructed they can be misleading for policy makers, (ii) can be too simplified and lead to simplistic conclusions, (iii) may lead to inappropriate policies if dimensions that are difficult to measure are ignored, (iv) the selection of indicators and weights can be challenging or even questionable (Nardo, et al. 2005).

Econometric models (all models of direct measurement of QoL, migration)

The main advantage is that it allows weights to be obtained by estimation of the econometric functions based on data. Thus, one might argue that the estimation process is less subjective. Econometric modelling is a well established method and results from various types of regressions are obtained relatively quickly. However, assuring robust results requires solving many data and model-related problems. These problems include heteroskedasticity, multicollinearity, hidden trends, outliers, omitted variables, misspecification of the functional form and many other problems (see Greene 2003).

All in all, it is not the easiest and most transparent method. However, there is a trade-off between transparency and accuracy. Clear guidelines and software can help to overcome some of the aforementioned problems and make the method more transparent by still maintaining its ability to grasp complicated real data relations.

System dynamics models (e.g. operationalisation of the capability approach by Grasso (2002))

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System dynamics is an interesting methodology for studying and managing complex feedback systems as one finds in social systems. It allows taking into account a wider array of influencing factors, including dynamic relationships between sub-components. Although it is effective in studying technical and

social mechanisms, its application to QoL studies is rather unusual because, in this context, it is particularly difficult to define system boundaries.

Conclusions

While the conceptual basis for QoL measurement was improved significantly in recent years, empirical applications are still somewhat experimental. In the context of rural regions, developing a QoL index based on firm theoretical footings would probably require a hybrid approach, where secondary data gaps are filled by survey data for the time being until these missing variables are integrated into data gathering exercises of statistical offices.

Offering a conceptually sound composite indicator for rural regions is beyond the scope of this review article. However, given the current state- -of-the-art, we can envisage an index based on empirical (objective) derivation of weights via an econometric model (i.e. where the weights of index composites come from estimation of a QoL function). The proxy for the QoL dependent variable in such a composite index could be a regional net migration (e.g. NUTS 2) and the initial choice of explanatory variables should be inspired by several research streams presented in this paper. Testing such an empirical Index of QoL is our goal in the ADVANCED-EVAL Project (see the project web site http://134.245.140.44/home).

Data restrictions should not hinder pushing for better measurements. In our view, improving data collection in the following areas would be particularly beneficial for a better representation of QoL in general, which would of course also benefit rural development. First, outcome measures, as promoted by the capability approach, are superior to the many input measures currently applied. To implement this in a serious way requires a substantial endeavour in terms of conceptual advancement and data collection alike. Second, the distinction between stocks and flows as measures of future and current wealth respectively is a necessity from the sustainable development viewpoint. Only stocks tell us something about the real wealth of a society including its natural base to ensure long-term social welfare. The drawback is data availability on the regional level, but the development of manufactured, human and natural capital is certainly conducive to include in regional comparisons because depletion would have local effects. Considering data availability, it is certainly recommendable to develop full national capital accounts, but it would need to be discussed to what extent regional accounts are also feasible. We identified above several approaches

which tackle this for the natural capital category. These accounts need to form a separate measure of wealth from a (current) quality of life assessment.

Acknowledgements

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