Construction of a Composite Indicator for the assessment of Quality of Life

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The paper proposes the construction of a composite indicator for the assessment of quality of life within Europe.

The construction of the indicator is based on the author's own perspective on quality of life concept inspired from and filtered through the study of more than one hundred papers on quality of life and a range of other existent composite indicators of quality of life.

The analysis is focused on the 27 member states of the European Union as well as Norway and the candidate countries of Turkey, Macedonia and Croatia.

A database including more than 100 measures/indicators that describe quality of life, using various sources (Eurostat, EurLIFE, EQLS, EWCS, WHO, Eurobarometer etc.), is considered as a starting point. Different preliminary analyses are conducted and several criteria are applied in order to keep the most significant measures/indicators in the final construction of the composite indicator.

One important problem encountered in the composite indicator of quality of life construction consists in dealing with insufficient data, as many of them are coming from infrequent surveys carried out in different years. Thus, a second purpose of this paper is to suggest a few new variables significant for the level of quality of life within Europe - these should be surveyed annually in order to achieve an objective and realistic image.

Keywords: quality of life, composite indicator, multivariate statistical methods, poverty.

Introduction

The measurement of quality of life (QOL) must take into account the complexity of the concept. In the context of assessing quality of life, the need to construct composite indicators is explained by the multi-dimensional nature of this concept, which takes multiple social, economic, and political facets, as well as aspects related to health and environmental conditions. Given the multi-dimensional nature of QOL, the traditional monetary measures of well-being and economic development (per capita gross domestic product (GDP), or related measures of income) cannot alone explain the broader quality of life in a country.

The utility of a composite indicator is motivated by the fact that it is able to capture additional dimensions of life, while keeping the property of generating a complete ordering of the households, administrative-territorial units, or areas according to their level of quality of life. This property is fundamental in the performance of complex analyses of quality of life, which are required in the process of targeting within the policies and programs addressed to quality of life improvement and disparities' reduction.

Concept of Quality of Life and its assessment across countries

Quality of life is approached in the literature from a holistic perspective on life, being characterized by referring to the dimensions of individuals' life: family, job, health, education, income and social life, and being filtered by individuals' experience, values and expectations. Moreover, the quality of the social environment completes the picture of individuals' objective living conditions and subjective well-being. Different situations in the different societies influence people's life strategies and their quality of life

(EFILWC, 2004). Quality of life is a broad concept and can be defined in many different ways, according to the fields that use it: sociology, political science, economics, psychology, philosophy, marketing, environmental sciences, medicine and others.

The World Health Organization, concerned with health related quality of life, defined QOL as "an individual's perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations, standards, and concerns" (WHOQOL-Group, 1998, p. 551). Terms, such as social well-being, social welfare, and human development are often used as equivalent or analogous terms. (Beham, Drobnič, and Verwiebe, 2006, p.5).

Although the literature does not show a single, generally accepted definition of quality of life, in most of the papers the concept is seen as a multi-dimensional construct, with both subjective and objective components. The concept of QOL was developed in the mid 1960's as an alternative to the concept of the "affluent society" which was increasingly being questioned as a measure of society's wealth. This is reflected in President Johnson's 1964 characterization of the "great society" as being "concerned [...] not with the quantity of goods but with the quality of lives". (Campbell, 1981, p. 37)

According to Noll (2004), two contrary approaches to quality of life have evolved in the past: the Scandinavian level of living approach (Erikson, 1974) and the American quality of life approach (Campbell, Converse, and Rodgers, 1976).

Both approaches have been enriched over time so the quality of life assessment to be based on both objective and subjective indicators. "Subjective quality of life is about feeling good and being satisfied with things in general. Objective quality of life is about fulfilling the societal and cultural demands for material wealth, social status, and physical well-being" (Noll, 1998).

The Scandinavian approach focuses entirely on resources and objective living conditions and defines quality of life in terms of control over resources such as money, property, knowledge, mental & physical energy, social relations and security. The individual is perceived as an active human being that uses his/her resources to pursue and satisfy basic interests and needs (Erikson 1974; Erikson 1993).

Allardt (1993) uses both objective measures of external conditions and personal subjective evaluations by the citizens themselves to develop a richer and more inclusive theoretical approach to quality of life based on meeting three basic sets of needs: (1) "having" which refers to material conditions that are necessary for survival and for avoidance of misery (e.g. income, housing, employment, working conditions, health, education); (2) "loving", defined as needs which relate to other people and to form social identities (e.g. contacts in a local community, family, friendships, memberships in associations and organizations); and (3) "being" which stands for the need for integration into society and to live in harmony with nature (e.g. involvement in political activities, leisure activities, engaging in meaningful work, opportunities to enjoy nature, participation in decisions making etc).

Quality of life research in the United States has been predominantly concerned with the measurement of subjective indicators. American approach considers the individual as being the best expert to evaluate his/her quality of life in terms of subjective well-being (Noll, 2004). "The quality of life must be in the eye of the beholder" (Campbell, 1972, p. 442).

Subjective well-being refers to people's evaluations of lives and is comprised of four separable components: life satisfaction (global judgements of one's life), satisfaction with important life domains (e.g. work, family, health), positive affect (experiencing many pleasant emotions and moods), and low levels of negative affect (experiencing few unpleasant emotions and moods).

Personality, personal goals, comparison processes (e.g. with other people, past conditions, aspirations, ideal levels of satisfaction), and culture have an important impact on subjective well-being (Diener, 2000).

In a more recent approach, Lane (1996) defined QOL as the relation between a set of objective conditions and two subjective or person-based elements: a sense of subjective well-being and personal development, and learning and growth. This approach emphasizes the active role of the person and highlights the importance of integrating personality concepts such as skills/capacities, beliefs and knowledge, emotions

and evaluations and states of being into the measurement of QOL (Beham, Drobnič, Verwiebe, 2006, p.8).

Canadians view the concept of QOL as being different from the standard of living (which is described as a measure of the quantity and quality of goods and services available to people) and consisting in the "product of the interplay of the social, health, economic and environmental conditions which affect human and social development" (The International Society for Quality of Life Studies definition of QOL).

The Canadian approach emphasizes that the quality of life indicators must be relevant to citizens and must reflect their values about what contributes to QOL. The areas that matter most to Canadians were identified to be youth, jobs, health, the environment and technology (1999, *Speech from the Throne*). For the general public, the term *quality of life* appears to represent the explicit linkage of economic and social policies and objectives (EKOS, 1999). Canadians recognize that "good social policies and programmes are a necessary ingredient to economic growth and increased living standards" and they are concerned about what is often called "human investment", e.g. health, education, skills development and children's outcomes.

An illustrative set of QOL indicators were identified by officials from Statistics Canada and the Treasury Board Secretariat and included in *Managing for Results 1999* (TBS, 1999). It comprises the following three groups of indicators: (1) *Health, Environment and Public Safety* (air/water quality, life expectancy, infant mortality, health status, crime rates, violent crime); (2) *Economic Opportunity and Participation* (educational attainment; literacy rates; employment rates; per capita Gross Domestic Product; discretionary income; research and development/innovation); (3) *Social Participation and Inclusion* (measures of racism and discrimination, voter turnout, voluntarism, cultural activity and outputs).

As regards the preoccupation for the construction of composite indicators of quality of life, several multi-dimensional approaches of quality of life – alternatives to monetary measures – have been developed in the last forty years, resulting in a range of synthetic indicators. They represent improvements in terms of describing the multi-dimensionality of the concept, but they are still limited by their inability to cover all the domains of QOL, arbitrary weights and arbitrary selection of variables.

In the following paragraphs, a selection of composite indicators of quality of life is briefly reviewed.

Physical Quality of Life Index (PQLI) [Morris, 1979] was proposed as an alternative to per capita GDP for measuring the well-being of people. The PQLI is a function of life expectancy at age one, infant mortality rate, and literacy rate.

Human Development Index (HDI) [UNDP, since 1990] is based on the assumption that economic development does not necessarily equate to human development or improvement in well-being and is composed of three indicators: life expectancy at birth, educational attainment and real GDP per capita.

Composite Basic Needs Indices [Ram, 1982] involved 5 variables covering 82 countries and used principal components analysis as a weighting method. The aggregate format was the additive one. The dimensions of development distinguished here are: demographic dynamics; education, training and knowledge; health, food and nutrition; human settlement, infrastructure and communication; income and economic growth (Booysen, 2002).

Quality of Life Rankings [Slottje, 1991] comprised 20 economic and social variables on 126 countries and used a mix of hedonic regressions and principal components analysis as weighting methods and the functional form for the aggregate format (Chakravarty, 2000; Booysen, 2002). Comparing to the dimensions of Ram's indicator, this one comprises 3 additional aspects: political and social stability; political and civil institutions; unemployment and labour utilization.

Dasgupta and Weale (1992) constructed a measure of QOL that included per capita income, life expectancy at birth, adult literacy rate, and indices of political rights and civil liberties (Rahman, Mittelhammer, Wandschneider, 2003).

Index of Economic Well-Being (IEWB) developed by Lars Osberg and Andrew Sharpe is based on the view that the economic well-being depends on the level of consumption flows, net societal accumulation of stocks of productive resources, poverty and income inequality and economic security from job loss and unemployment, illness, family breakup, poverty in old age (Sharpe, 1999, p.17).

The Economist Intelligence Unit (EIU) developed, in 2005, a "quality of life" index based on a methodology that links the results of subjective life-satisfaction surveys to the objective determinants of quality of life across 111 countries. The model includes 9 factors: health, material wellbeing, political stability & security, family relations, community life, climate, job security, political freedom and gender equality; the first three factors being the most important according to their weights (EIU, 2006, pp. 1-2).

The methodology used to construct the composite indicator

The construction of a composite indicator of quality of life aims to define a unique numerical indicator C as a composite of the K primary indicators I_k, computable for each elementary population unit U_i, and significant as generating a complete ordering of the population U of households or of administrative-territorial units according to their quality of life level (after Asselin, 2002, p.3). Thus, a composite indicator of quality of life C takes the value C_i (I_{ik}, k =1, K) for a given elementary population unit U_i.

There are a range of QOL models already in place and a number of indicators such as life expectancy, quality of physical environment, crime rates, poverty rates, plus economic statistics such as per capita GDP which are typically found in most QOL models. Since there is no consensus on a generally accepted definition, the following definition was adopted for the development of the composite indicator of quality of life: *quality of life is the consequence of a sum of interactions among multiple aspects of a person's life, (physical existence, social life, economic and political climate) combined with individuals' perceptions of their lives*. Three pillars of the composite indicator were identified, as follows:

1. LIVING WITH or the *Quality of physical life* – refers to food and housing, amenities (electricity, water, sanitation, basic goods), health and access to health services (life expectancy, infant mortality, health status, physicians per 100000 inhabitants, distance to the closest medical unit etc.), environment and public safety (air/water quality, pollution from traffic or industry, complaints about water/ noise/ waste, buildings in a bad state of repair, trust in police/justice, criminality, road safety etc.), infrastructure;
2. LIVING FOR or the *Quality of social life* – refers to family, friends, leisure time, social participation and inclusion in community, life satisfaction;
3. LIVING IN or the *Quality of economic and political life* – refers to economic and political climate, expressed by quality of work and employment, economic opportunity (investments in education and access to education, research and development/innovation, access to media), stability, national vitality and security, freedom (freedom of expression), governance (trust in public institution).

Pillar 1 includes the access to durables and services necessary to live a decent life, being close to the Scandinavian approach of quality of life which focuses on *having*. Pillars 2 and 3 are created considering some ideas from American and Canadian approaches as they include several subjective indicators.

Construction of a composite indicator requires the most relevant indicators in each domain of quality of life to be identified, including both subjective and objective data. The selection of indicators involves decisions on statistical questions as well as judgements about values. In order to create the initial database of sub-indicators, multiple sources were consulted, such as: Eurostat, *EurLIFE*, *EQLS 2007* and *EWCS 2010* pages on Eurofound website, Eurobarometer, WHO and World Bank databases. All those indicators found to describe the identified dimensions of QOL have been included in the database.

Several restrictions were applied in the selection of the final set of indicators, as follows:

- Only those indicators with values for at least half of the analyzed countries were retained, since the missing values mainly occur in developing countries, which might register deprivations in the aspects of life described by the considered indicators.
- Available data on the selected indicators should not be older than the year 2000. Some exceptions were accepted when the indicator had high relevance for the study and the information could not be communicated using another indicator. For some variables, averages of the values registered in different years were computed.

- The sign (polarity) of the indicator should be clear for the objective of the composite indicator. Those variables which are not able to express a certain level of quality of life were excluded, although they might have an influence on the quality of peoples' lives (such as: divorce rate, religious service attendance, home ownership etc.).

The original data set comprised over 100 measures. After reviewing it for relevance of the indicators and for redundant information, only 48 measures (grouped as presented in the table below) were kept in the QOL model. Several Principal Component analyses were conducted in order to weight and aggregate the data. All the considered measures have quite high correlation coefficients with their corresponding indicators. The correlation between each indicator and the corresponding pillar, the correlations between pillars and that between each pillar and the composite index are also high. Missing value analysis showed proportions of missing values over 20% for two variables and significantly over 30% for 4 cases (Norway and the three candidate countries), suggesting a further review of the data set is required.

Table 1. The components of the Composite Indicator of Quality of Life

PILLARS	INDICATORS	MEASURES	
LIVING WITH or the *Quality of physical life*	Access to food, housing conditions, durables	Inability to afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day Inability to keep home adequately warm Share of total pop. living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames of floor	Share of total pop. having neither a bath, nor a shower, nor indoor flushing toilet in their household Enforced lack of a personal car Enforced lack of a telephone Enforced lack of a colour TV Enforced lack of a computer Enforced lack of a washing machine
	Population health status	Infant mortality rate People with unmet needs for medical examination (%), reason: too expensive	Life expectancy at 65 years
	Environment and public safety (To be revised)	Unsafe to walk around at night Satisfaction with the work of the police Crime, violence or vandalism in the area Road safety (fatalities)	Buildings in a bad state of repair Noise from neighbours or from the street Pollution, grime or other environmental problems
LIVING FOR or the *Quality of social life*	(To be revised)	Happiness Life satisfaction Optimism Too little time for hobbies and interests Satisfaction with social life	Satisfaction with family life Activity in a political or charitable organisation Activity in an organisation for personal reasons Inability to afford paying for one week annual holiday away from home
LIVING IN or the *Quality of economic and political life*	Access to education Investments in education	Households - Level of Internet access Access to information on learning possibilities (%) Life-long learning (adult participation in education and training) across population aged 25-64 Annual expenditure on public and private educational institutions per pupil/student	Total intramural R&D expenditure (GERD) by sectors of performance (Euro per inhabitant) Total public expenditure on education as % of GDP Public subsidies to the private sector as % of GDP
	Quality of work and employment	Work in dangerous or unhealthy conditions Job prevents giving time to the family Too tired after work Job satisfaction	Likelihood of losing the job LMP expenditure (PPS per person wanting to work) Unemployment rate
	Quality of political climate	Tensions between different ethnic groups Quality of social services Corruption Perceptions Index	Trust in the police Trust in the judicial system Rating of the political system

Conclusion

Construction of the composite indicator followed the recommendations from literature: it comprises both subjective and objective indicators, it tries to cover as many dimensions of the quality of life as possible among those identified through the literature search, it combines indicators that are relevant to countries with different visions on quality of life.

Some limits of the study are as follows: (1) data are coming from different years - there are different variables with data collected in different years, but the same year for all the countries; or a single variable has data collected in different years for different countries; (2) it was not possible to find any available data to describe certain aspects of QOL, such as national vitality and security, and freedom.

Further developments include: adding new indicators in the model and revisions of the set of indicators; weighting and aggregation issues; robustness and sensitivity analyses; association with other variables (such as GDP, HDI, EIU index, IEWB of Osberg and Sharpe).

The construction of the proposed composite indicator is based on the framework developed in the JRC/OECD *Handbook on constructing composite indicators. Methodology and user guide*, as well as on the recommendations of JRC Training Course *Constructing Composite Indicators: From Theory to Practice*

(that took place in Luxembourg, on 18-19 October 2010).

Acknowledgements

This work was possible with the financial support of the Sectoral Operational Programme for Human Resources Development 2007-2013, under the project number POSDRU/89/1.5/S/49944.

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