

MODELLING QUALITY OF LIFE FOR SUSTAINABLE DEVELOPMENT

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Abstract

The growing human population and the strain on natural resources are having an adverse effect on human lives. Findings from leading research organizations have highlighted that the accelerated depletion of natural capital is expected to be a big challenge for Sustainable Development (SD) of the world in the medium to long term future.

SD is currently defined as, ‘Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs’. However the current trend of research indicates that this view of SD is limited. Major areas of focus for SD are economic, social and environmental. One area not reflected well in the existing models is quality of life. The rationale behind this is the complexity and difficulty in modelling.

Scarcity of natural resources, potable water and the slow pace of development for alternate sources of energy coupled with the affects of climate change will drive nations around the world to conflicts. With human population estimated to reach 9 billion by 2050 there would be an adverse impact on the quality of life (QOL) of people.

The Well-Being Index (WI), Genuine Progress Indicator (GPI), Global National Happiness (GNH) and Quality of Living are used to capture QOL, albeit with limited success.

There is a need to define QOL in an easy to understand way and develop a user-friendly and practical model to provide inputs to models on SD. This paper analysis existing measures of QOL and outlines the need for a framework for a conceptual model capable of making informed decisions in the area of SD.

Key Words: Sustainable Development (SD), Quality of Life (QOL)

1. Introduction

The long-term future of world economies, the social fabric and environment are strongly dependent on how we meet the needs of the present generation without compromising the needs of future generations. The World Business Council for Sustainable Development (WBCSD) states that current global consumption patterns are unsustainable. The world is losing between \$2-\$5 trillion in natural capital/ year due to the degradation of the ecosystems. 3/4th of the planet's population lives in countries where consumption outstrips biological capacity [1]. According to a 2008 US Intelligence Community Study, oil and gas supplies will continue to dwindle and production will be concentrated in unstable areas. New energy technologies generally take 25 years to become commercially viable and widespread. By 2030, 1.4 billion people in 36 countries are likely to face water shortages that will have a substantial impact on food production [2].

The Garnaut Climate Change Review commissioned by the Australian Government to examine the impacts, challenges, and opportunities of climate change to Australia, states that under a no mitigation scheme there will be a 92% decline in irrigated agricultural production in the Murray-Darling Basin, affecting dairy, fruit, vegetables, grains. Complete destruction of the Great Barrier Reef. (Tourism in the Reef generates over \$5 billion/year), and over 4000 additional heat-related deaths in Queensland/year. If these forecasts occur it will adversely impact the quality of life of people in Australia and other countries around the world [3].

Due to the changing nature and the increasing complexity of the modern economy, the consequences of future developments and interventions by governments on SD and ultimately on QOL are difficult to perceive and incorporate into policy making. The Brundtland Commission defined SD as “Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs” [4]. Challenges with the current SD definition include: Focused on environmental and economic impact and not on other elements of sustainability. It has limitations capturing social aspects and quality of life. It also fails to address the space and time dimensions.

Decisions taken by stakeholders not only have an economic and environmental impact but also affect the social lives of individuals. While the pursuit of happiness and QOL has long been of interest to individuals, in recent years it has become a priority for people, organizations and leaders worldwide. The UK government has appointed Lord Richard Layard, with the responsibility for advising on policies to improve wellbeing in Britain. The President of India has announced the creation of an Index specifically for her country for measuring QOL. French President Nicolas Sarkozy announced that a panel of eminent scholars, led by Nobel Laureates Joseph Stiglitz and Amartya Sen, would develop new economic indicators that would assess wellbeing in France [5]. The study of QOL is now not only of interest to philosophers and psychologists but also to the common people, economists and political scientists.

This paper reviews current practices pursued to address/measure QOL. Based on the analysis of existing models the need for a framework for a conceptual model is outlined for making informed decisions in the area of SD considering QOL.

2. Quality of Life

Literature shows that there is no widely accepted model or measure for QOL. There are many debates about how best to measure QOL or its reflection in various aspects of daily life. Previous studies in QOL research have focused on two levels of analysis. Traditional measures are typically ‘objective’ and ‘subjective’. ‘Objective’ QOL reflects objective circumstances in a given cultural or geographical unit and is based on objective, quantitative statistics [6]. For example, it incorporates health indicators, crime rates, education levels, work force participation and proportion of welfare recipients in a given area as indicators of objective QOL. ‘Subjective’ QOL is based on reports from individuals on the ‘meaning’ of aspects of their reality, and as such represents psychological variables [7]. These are assumed to be defined by people’s conscious experiences – in terms of hedonistic feelings or cognitive satisfactions [6]

The object of evaluation in QOL is the “life” [8], where the focus is on assessing the life of an individual. ‘Well-being’, ‘happiness’, ‘life satisfaction’ have all been used as proxy indicators of QOL. QOL is a multi-layered and multi-dimensional concept [9], [10], [11]. It is multi-layered in the sense of its representation at the level of individual, family and community, and it is multi-dimensional in its reflection of various aspects of life.

In the context of this paper it is important to note that we’re looking at the QOL of people, whose lives are influenced by the decisions made by stakeholders in the value chain. In a global value chain, raw materials mined in a given location could be consumed as finished products anywhere around the world. In such a set-up it is difficult for organizations to keep track of the affect of actions taken by players in the value chain on the QOL of people. But with the rise of ethical consumerism organizations are obligated to look at the consequences of their decisions and actions not only on their employees, but also the lives of people and communities they source from, operate in and the end users.

The world’s biggest consumer market, the US, is recalibrating its’ sense of what it means to be a global citizen; by what it buys and what are the ethical standards of organizations. Companies are being punished by consumers for unethical behaviour. In the 1990s, companies like Nike and Walmart were attacked for discriminatory and unfair labor practices. People are alarmed about “blood diamonds,” or “conflict diamonds”- gems mined in war zones and used to finance conflicts. More recently, consumers have become concerned about the sourcing of metals used in computers and i-phones [12].

From an organizations point of view, it is important that its operations have a positive impact on the QOL of people working for it, the community it operates it and on the lives of people

upstream in the value chain. Figure.1 depicts the domain of influence an organizations' actions have on the QOL of people.

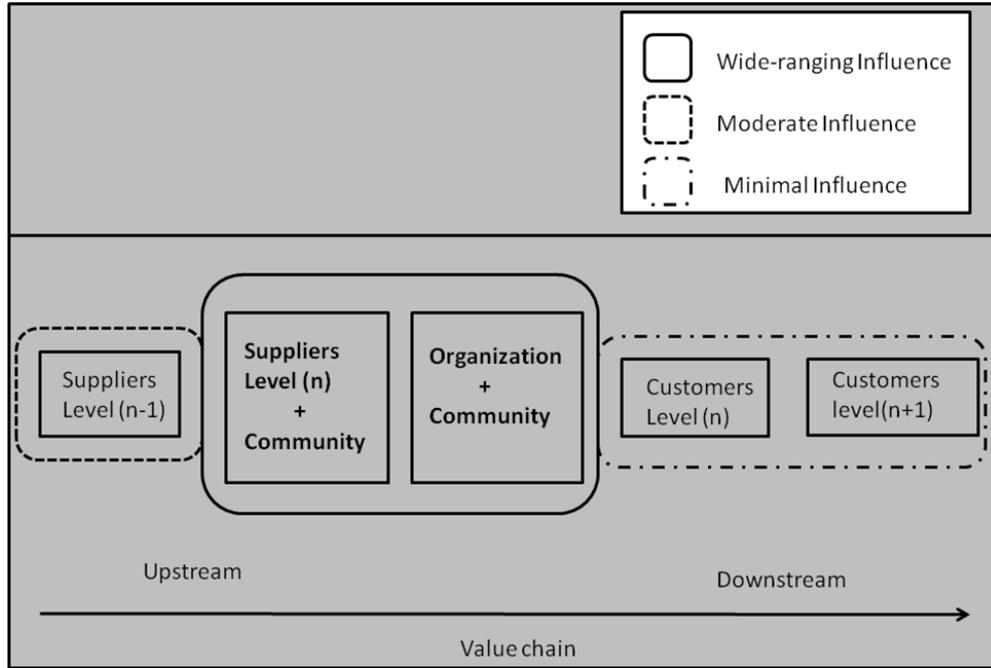


Figure 1: Domain of influence of an organization's decisions on the QOL of people

3. Measuring QOL

Research on QOL is focused on micro and macro level analysis. At an individual or micro level, where satisfaction with life is subjectively assessed by individuals, or at an aggregated or macro level, where objective indicators (such as crime rates, poverty, health, accessibility, pollution) are used to develop a composite ranking indicating regional variations in the QOL [13], [14], [15].

At a macro level, measures of national income and output (Gross Domestic Product (GDP), Gross National Product (GNP)) are used to estimate the total economic activity, which indicate material well-being and explain the broader QOL in a country. Critics argue the efficacy of these indicators to measure QOL. According to Senator Robert Kennedy, "Gross National Product counts air pollution and cigarette advertising, and ambulances to clear our highways of carnage except that which makes life worthwhile." [5] Indicators like Gross Progress Indicator (GPI), Index of Sustainable Economic Welfare (ISEW) have tried to adjust GDP by quantifying facets that are omitted by the GDP measure such as various non-market activities and social ills similar to environmental pollution. But the approach has faced insurmountable difficulties in assigning monetary values to the various factors and intangibles that comprise a wider measure of socio-economic wellbeing.

There have been numerous attempts to construct alternative, non-monetary indices of social and economic well-being by combining in a single statistic a variety of different factors that are thought to influence QOL (Gross National Happiness (GNH), Life Quality Index (LQI). The main problem with these measures is selection bias and arbitrariness in the factors that are chosen to assess QOL and in assigning weights to different indicators to come up with a single synthetic measure [16].

At a micro level, surveys are used in QOL research. Despite the growing interest in recent years in life-satisfaction surveys there have been a range of criticisms on the way the surveys are conducted. One objection is that responses to surveys do not adequately reflect how people really feel about their life; they allegedly report how satisfied they are expected to be. The other criticism is that life-satisfaction responses reflect the dominant view on life, rather than actual quality of life in a country. GNH, Satisfaction with Life Index (SLI), The Economist Intelligence Unit's 'Quality-of-life Index' (EQQOLI) are measures that use surveys to gauge QOL.

The role of income and income distribution is often attributed as an indicator of wellbeing. Studies done by the Legatum Group have found that there is a linear relationship between life satisfaction and increasing income level. The "Easterlin Paradox" one of the earliest and most established findings of academic research on human wellbeing in 1974 identified that even though more income may appear to produce higher levels of life satisfaction, data indicates that rich countries that have become even richer have not become any happier. New studies suggest that because the relationship between income and life satisfaction is logarithmic, each step increase on the life satisfaction scale requires a doubling of income.[5] Indices like the Gini coefficient, Atkinson's Index, Suits Index, Theil Index are used to measure the income inequality and gauge movements in different income distributions. They show how the distribution of income/wealth has changed over time and indicate if inequality is increasing or decreasing. The limitation with these measures is that, they cannot be used as an index by themselves, but can only be as an input in the measurement of wellbeing indices.

The key factors for promoting life satisfaction also vary according to a country's level of development. In richer countries, where moving beyond material wealth to broader wellbeing is an important goal, the most important components of liveability might include: Continued High Levels of Income, Good Health, Political Rights and Civil Liberties, Family Life, Pleasant Natural Environment. Many poor countries have surprisingly high levels of wellbeing, because traditional social strengths can compensate, for low average standards of living. In these countries, the important components of comparative liveability include: Family Life, A Warm Climate and Religious Faith [5]. It needs to be investigated though, whether people attribute equal importance to all components of liveability or a hierarchy amongst these components exists when they make decisions. For instance people living a subsistence life might give a higher priority to increase in material wealth before they can allude to other components of liveability.

4. Review of QOL Practices

A review of the QOL measures and indicators is presented in this section.

S.No	Indicator	Agency	Date	Fundamental definition	Limitations
1	Gross Domestic Product (GDP)	Simon Kuznets (National Bureau of Economic Research - US)	1937	Measure of a country's economic performance, is the market value of all goods and services made within the borders of a nation in a year	Does not address 1) Wealth distribution 2) Non-market transactions -volunteer or unpaid services 3) Underground economy - tax evasion 4) Non-monetary economy - bartering 5) Quality of goods 6) What is being produced - war, crime 7) Externalities - damage to environment 8) Sustainability of growth [17],[18]
2	Gross National Product (GNP)	National Bureau of Economic Research - US	1942	Measure of the value of goods and services produced in one year by all nationals of a region	Same as GDP
3	Gini coefficient	Corrado Gini,' Variability and Mutability'	1912	The Gini coefficient measures the inequality of income and wealth in a given population	1) It cannot be used as a measure of egalitarianism - countries with different migrant populations 2) It doesn't measure growth in incomes over time 3) It ignores countries where income might come from different forms than money -subsistence farming, bartering 4) Social benefits provided by governments might not be included as income in its calculation [19], [20]
4	Atkinson Index	Anthony Barnes Atkinson	1970	The Index is a measure of the economic income equality and is able to gauge movements in different segments of the income distribution	
5	Theil Index	Henri Theil	1967	The Theil index measures the economic inequality. It exhibits decomposability unlike the Gini coefficient i.e., economic inequality within a country will be the inequality within each state, weighted by state income, plus the inequality among states	

S.No	Indicator	Agency	Date	Fundamental definition	Limitations
6	Suits Index	Daniel Suits	1970	The Suits index is a measure of collective progressivity	Because of lifetime income smoothing, consumption is a better measure of economic well-being to compare tax burdens, than the Suits index [21]
7	Misery Index (economics)	Arthur Okun - adviser to President Lyndon Johnson	1960	Is an economic indicator found by adding the unemployment rate to the inflation rate. It is assumed that both a higher unemployment and a worsening of inflation create economic and social costs for a country	Is a lag indicator and can hence be used as an input for QOL calculations [22]
8	Genuine Progress Indicator (GPI)	Marilyn Waring (UN System of National Accounts)	1980	GPI starts with the same personal consumption data that the GDP is based on, but adds factors such as the value of household and volunteer work, and subtracts factors such as the costs of crime and pollution	Adopted by only a handful of countries, countries still rely on GDP to track growth [23]
9	Index of Sustainable Economic Welfare (ISEW)	(William Nordhaus/James Tobin,' Measure of Economic Welfare'), John Cobb/Herman Daly	1989	ISEW is similar to the GPI, in that, it balances consumer expenditure by factors such as income distribution, and cost associated with environmental degradation and unsustainable growth	Similar to the GPI, its adoption is limited [24]
10	Gross National Happiness (GNH)	Bhutan's King Singye Wangchuck	1972	GNH is based on the premise that true development of human society takes place when material and spiritual development occur side by side. It is not measured directly, but only the factors which are believed to lead to it	1)There is no exact quantitative definition of GNH 2)Subjective in nature, hence governments can define it in a way that suits their interest [25]
11	Uneconomic Growth (UG)	Marilyn Waring/Herman Daly (World Bank)	1990	Uneconomic growth occurs when increases in production come at an expense in resources and well-being that is worth more than the items made	1) UG looks at challenges transcending countries borders, but nations seldom address issues beyond their boundaries 2) UG depends on regressive long-term studies, while political decisions are made in the present 3) Doesn't address rebound effect [26], [27]

S.No	Indicator	Agency	Date	Fundamental definition	Limitations
12	Green gross domestic product (GGDP)	Chinese Premier - Wu Jiabao	2004	GGDP tries to incorporate the environmental costs associated with economic growth of the country	Has been discontinued, as incorporating environmental damage and resource depletion has reduced growth rate to unacceptable political levels
13	Standard of living (SOL)			SOL refers to the quality and quantity of goods and services available to people, and the way these goods and services are distributed within a population. It is measured by standards such as income/person and poverty rate. It is the ease by which people living in a time or place are able to satisfy their wants	1) SOL doesn't include intangible aspects of social life 2) With the same material standard of living, quality of life in 2 countries might be different 3) Does not incorporate the income distribution in the country
14	Legatum Prosperity Index (LPI)	Legatum Capital	2007	LPI produces a ranking of countries based on the conditions in that country that foster prosperity. It endeavours to rank countries according to the strength of the drivers and restrainers of prosperity [5]	
15	Easterlin Paradox	Richard Easterlin, ' Does Economic Growth Improve the Human Lot? Some Empirical Evidence'	1974	The Easterlin Paradox states that within a country though people with higher incomes are more likely to be happier, the average reported levels of happiness does not vary much with national income/person	The concept has been refuted by recent research which state that happiness is related to the logarithm of absolute income i.e, above a certain point, happiness increases more slowly than income, but no saturation point is ever reached [5]
16	Jevons Paradox (JP)	Stanley Jevon, 'The Coal Question'	1865	JP is of the observation that greater energy efficiency, while in the short-run produce energy savings, may in the long-run result in higher energy use	1) JP ignores benefits like better quality of life with increased efficiency gains 2) JP applies to technological improvements and wouldn't apply to corporate or government policies [28]
17	Satisfaction with Life Index (SLI)	Adrian G. White, University of Leicester		SLI is an attempt to show life satisfaction in different nations. It measures individual's perceived level of well-being and happiness. It's an alternative to traditional measures of policy success to GDP or GNP	1) Depends on surveys, hence subjective 2) Might vary in the same country in different years depending on the prevalent conditions - natural disasters, war

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18	The Economist Intelligence Unit's 'Quality-of-life index'	Economist Intelligence Unit	2005	The Index tries to link the subjective life-satisfaction surveys to the objective determinants of quality of life across countries. The index tries to supplement not supplant real GDP [16]	
19	Life Quality Index (LQI)	Institute for Risk Research, University of Waterloo	1990	LQI is a summary indicator of net benefit to society for improving the overall public welfare by reducing risks to life in a cost-effective manner. It can be used to assist decision-makers in evaluating the effectiveness of regulations and activities aimed at reducing risk to life, health and their environment [29],[30]	
20	Human Development Index (HDI)	Mahbub ul Haq , United Nations Development Programme	1990	HDI is used to rank countries by level of "human development", which implies whether a country is developed, developing or underdeveloped. It combines normalized measures of life expectancy, literacy, educational attainment and GDP per capita for its calculations	1)Does not address ecological impacts 2) Focuses on national performance, doesn't include affects of actions taken by countries beyond their boundaries 3) Criticism about the scoring system - the three measures are bound between 0 and 1 [31]
21	Goodwill (accounting)		1984	Goodwill is an intangible asset, which reflects the ability of the organization to make a higher profit than would be derived from selling the tangible assets	
22	Living Planet Index (LPI)	World Wide Fund for Nature/United Nations Environment Programme's World Conservation Monitoring Centre	1970	Is an index that indicates the state of global biological diversity, based on trends in vertebrate populations of species around the world. It offers insights into which habitats or ecosystems have species that are declining most rapidly	Though it gives a measure of the health of the species in the ecosystem, which indicate to a certain extent the impact of anthropogenic activities, its application is limited in defining QOL

S.No	Indicator	Agency	Date	Fundamental definition	Limitations
23	Quality of living	Mercer		QOLiving is an objective way of measuring quality of life based on factors that people consider representative of quality of living [32]	
24	Happy Planet Index (HPI)	New Economics Foundation	2006	HPI is not a measure of which are the happiest countries in the world, but is a measure of the environmental efficiency of supporting well-being in a given country. HPI = (life satisfaction*life expectancy/ ecological footprint)	<ul style="list-style-type: none"> 1) Confusion with the name - not a measure of happiness, rather measure of environmental efficiency 2) Is calculated every 5 years 3) Does not consider factors like political freedom, human rights, labor rights [33]
25	Global Peace Index (GPI)	Steve Killelea, Economist Intelligence Unit	2007	GPI is an attempt to measure the relative position of a nation's and region's peacefulness. It tries to decipher the factors that drive peace in a region	<p>Does not include factors like</p> <ul style="list-style-type: none"> 1) Functionality of a country's government 2)Regional integration 3) Hostility to foreigners 4) Importance of religion in national life 5) Violence against women and children

5. Limitations:

A challenge to quality-of-life research is that of aggregating the rich array of measures in a parsimonious way. The search for a scalar measure of quality of life is often perceived as the single most important challenge in this field. Traditionally, the most common response to these demands for parsimony has been to aggregate a number of indicators of average performance in various fields at the country-level. The best example of this approach is the HDI. However, choices on the weights used to construct this (and other similar indices) are controversial – they are either arbitrary or reflect value judgments on which there is not broad consensus.

There is no single indicator that can capture something as complex as QOL. For example, GDP is neither a measure of income nor a measure of well-being. Limitations of existing measures highlight how QOL is not captured in decision making [34].

6. Summary and Conclusion:

Sustainable development (SD) is currently defined as, ‘Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs’. However the current trend of research indicates that this view of SD is limited. Major areas of focus for sustainability are economic, social and environmental. One area not reflected well in the existing models is QOL. The rationale behind this is the complexity and difficulty in modelling. The Well-Being Index (WI), Genuine Progress Indicator (GPI), Global National Happiness (GNH) and Quality of Living are used to capture QOL, albeit with limited success. There is a need to go beyond measures of market activity to measure QOL. What we measure affects what we do; and if our measurements are flawed, decisions may be distorted. Measures of QOL should tell us whether what we are doing is sustainable, economically, environmentally or socially. This paper has reviewed existing models and outlines a need for a framework for a conceptual model for QOL capable of making informed decisions in the area of SD.

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