



## Quality of city life multiple criteria analysis



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### ABSTRACT

International practice applies several urban indicators for sustainable cities (Monocle's Quality of Life Survey, Quality of Life Index (QLI), Indicators for Sustainability, European Green City Index, City Blueprint and others). These urban indicators can serve in performing integrated monitoring, assessing and recommending objectives sought by cities by different quantitative and qualitative aspects. Some of these tools can be applied to assessing a city's quality of life. One of the goals of this article is to compare several alternative methods for assessing a city's quality of life and their accuracies. A comparison was performed of the QLI and INVAR methods while conducting an analysis of comparable data from the 2012–2016 surveys on the Quality of Life in European Cities. Upon establishing the rankings of European cities by their quality of life with the assistance of the QLI and INVAR methods, an estimation of correspondence of results obtained by both methods and sensitivity analysis were performed based on a quantitative tool proposed in this paper. The obtained values of such criteria revealed a good level of congruity between the ranks obtained by employing both methods. The sensitivity analysis indicated that the results yielded by both the QLI and INVAR methods for rating the quality of life in European cities per the ever-fluctuating 2012–2016 data were similar. In other words, there was little difference between these methods for city ranking. This research also provides the INVAR method and its abilities to supplement the QLI with new functions: quantitative recommendations for cities under analysis by the indicators under analysis, optimization of indicators with consideration of indicators achieved in the quality of life area, and establishment of the values of the indicators under analysis permitting the city under analysis to raise its rating to the desired level.

### 1. Introduction

An entire array of organizations (IIED and WBCSD, 2002; United Nations, 2015; WCED, 1987), scholars and practitioners (Amini & Bienstock, 2014; Ben-Eli, 2012; Caradonna, 2014; Chasin, 2012; Christen & Schmidt, 2012; Elkington, 1998; Espinoza & Porter, 2011; Gerlagh, 2017; Koroneos & Rokos, 2012; Lozano, 2008; Pappas, 2012; Schilling, 2012; Zavadna, 2013) have offered concepts and definitions of sustainability. These are briefly deliberated next.

The Brundtland Report (WCED, 1987) has suggested a concept of sustainable development and a straightforward definition, which have been widely cited around the world since that time. The Brundtland Report (WCED, 1987) states that sustainable development is, "... development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Later the International Institute for Environment and Development and the World Business Council for Sustainable Development (IIED and WBCSD, 2002) repeated this same concept of sustainable development and

explained it even more stating, "One of the greatest challenges facing the world today is integrating economic activity with environmental integrity, social concerns and effective governance systems. The goal of that integration can be seen as 'sustainable development' and should be to maximize the contribution to the well-being of the current generation in a way that ensures an equitable distribution of its costs and benefits, without reducing the potential for future generations to meet their own needs." Such worldwide political debates have continued until now (e.g., United Nations, 2015) by specifying sustainability concepts and definitions more and more accurately.

In the opinion of Ahi and Searcy (2013), the term "sustainability" has been understood in diverse ways, fluctuating from an inter-generational philosophical point to a multi-dimensional term for business management. As stated by Glavič and Lukman (2007), various sustainability terms and their definitions are used by various scholars, practitioners and organizations, for example, green chemistry, cleaner production, pollution prevention and others. Glavič and Lukman (2007) examined fifty-one selected sustainability terms and their definitions

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and performed a semantic analysis. According to [Ahi and Searcy \(2013\)](#), primary sustainability concepts tended to emphasize environmental issues and later they gradually adopted a triple bottom line (i.e., environment, economic and social) method to sustainability. In compliance with [Missimer, Robèrt, and Broman \(2017\)](#), the huge and increasing collection of concepts, methods and tools in the sustainability area suggest a necessity for a structuring and harmonizing framework, containing a uniting and effective definition of sustainability. [Ben-Eli \(2012\)](#) holds the opinion that the concept of sustainability covers different major variables (population size; rate of consumption of resources; impacts on absorption capacity of sinks such as forests, oceans and soil; rates of regeneration capacities; a measure of well-being and others), all theoretically measurable.

There is no commonly approved sustainability definition. Diverse sustainability understandings can be found. As stated by [Kirkby, O'Keefe, and Timberlake \(1995\)](#), many authors expressed sustainable development employing at least 70 diverse definitions that were compiled by 1992. As believed by [Elkington \(1998\)](#), sustainability can be a  $2 + 2 = 5$  (or even 50) game. In accordance with [Elkington \(1998\)](#), to achieve outstanding triple bottom line performance, new types of economic, social and environmental partnerships are needed. In accordance with [Lozano \(2008\)](#), it is feasible to break down the different sustainable development definitions into the following categories: (1) conventional economists' perspective; (2) non-environmental degradation perspective; (3) integrational perspective, i.e., encompassing economic, environmental and social aspects; (4) inter-generational perspective and (5) holistic perspective. In some cases, the boundaries between perspectives may be blurred. [Lozano \(2008\)](#) recommends that sustainability, as an idea, is as an integrating framework – a means for seeing the relationships between various dimensions, rather than just evaluating sustainability, i.e., as a single component. [Ben-Eli \(2012\)](#) offers the following sustainability definition, “A dynamic equilibrium in the processes of interaction between a population and the carrying capacity of its environment such that the population develops to express its full potential without producing irreversible adverse effects on the carrying capacity of the environment upon which it depends.” [Amini and Bienstock \(2014\)](#) integrated various viewpoints on corporate sustainability in order to develop a multidimensional and comprehensive definition of corporate sustainability. [Gerlagh \(2017\)](#) defines “generous sustainability” as a combination of two conditions: neither instantaneous maximin utility nor attainable maximin utility should decrease over time.

In the opinion of [King \(2013\)](#), the definition of “urban development” means dissimilar things to various individuals and can be used either in one area of a town or in an entire municipal area. The definition of urban development is “the development or improvement of an urban area by building” or “an urban area that has been developed and improved by building” ([Collins English Dictionary](#)). For example, Urban Development Concept Berlin 2030 delivers an inter-agency model for the long-term, sustainable development of the city by applying a variety of strategies and goals as well as highlights the areas that will concentrate its future development. The Urban Development Concept Berlin 2030 contains a status report and strategies for Berlin 2030. The status report specifies the strengths and weaknesses as well as the opportunities and risks regarding a sustainable development of Berlin. Based on this, the strategies for Berlin 2030 emphasize the capital's developmental goals, favorable initiatives and particular districts for exemplary realization.

There are extensive efforts made to adapt the sustainability concept in the urban development context. Several terms applied for the closest connection of the sustainability with the urban development concepts are sustainable urban infrastructure, sustainable urbanism, green urban development, ecological urbanism, green urbanism, sustainable city, eco-city, zero-carbon city, sustainable cities, resilient cities and eco-municipalities. These terms can also encompass an entire array of the definitions of their composite parts, such as green building, green construction, sustainable building, natural building, ecohouse,

sustainable architecture, ecological design, ecological restoration, sustainable landscape architecture, renewable energy and the like.

As stated by [Ji, Li, and Jones \(2017\)](#), various green urban development concepts exist in China; these are not specifically defined by standards and regulations. In the opinion of [Jabareen \(2006\)](#), urban sustainable forms are defined by compactness, sustainable transport, density, mixed land use, diversity, passive solar design and greening. [Stossel, Kissinger, and Meir \(2017\)](#) hold the opinion that the advancement of urban sustainability needs an application of different measures such as environmental policy, behavioral change and technological developments, which have to be taken at different spatial scales. [Shen, Xiaoling Zhang, and Shuai \(2017\)](#) analyze the efforts of sustainable urbanization by different international institutions and local governments all over the world involved in sustainable urbanization at different levels. According to [Fu and Zhang \(2017\)](#), sustainable city concepts, eco-cities and low-carbon cities in China represent two trends to encourage urban sustainability. In the opinion of [Fu and Zhang \(2017\)](#), the eco new cities are worried about the development of a sustainable way of life and a sustainable way of production with an uneven stress on economic sectors such as industrial integration and transformation.

The effort for sustainable city development is to assure a balanced development of a city and its composite parts by satisfying the well-being of its residents in the present while not harming their life styles in the future. Such a goal can be implemented by employing various social, economic and environmental methods as well as methods from other scholarly fields. The endeavors for sustainable city development are for decreasing poverty, improving the quality of life and social contacts as well as community relationships by satisfying major human needs and fostering economic and political developments that are conducive while attempting to avoid damaging the natural resources. It is possible to perceive a unity of contradictions in the sustainable development of cities, when some goals contradict others. For example, economic growth is impossible without a greater use of resources; therefore some scientists propose conserving nature by reducing consumption. Balanced economic development does not necessarily encompass the dimensions of ecological, social and cultural balanced developments. Frequently scholarly literature discusses whether a balance is possible in practice between economic, environmental and social developments of a built environment and cultural diversity. Therefore the methods of multiple criteria analyses are most suitable for analysing sustainable city developments.

In the opinions of the International Institute for Environment and Development and the World Business Council for Sustainable Development ([IIED and WBCSD, 2002](#)), what is essential in an effort to reach the goals of sustainable development involves “verifiable measures to evaluate progress and foster consistent improvement.” [Hodge and Hardi \(1997\)](#) claim that an obvious sustainability conceptual framework is vital for valuation objectives since it supports to detect appropriate indicators that can be adapted to a concrete context if required. [Dalal-Clayton and Barry \(2014\)](#) analyzed the metrics employed for the evaluation of sustainability, such as indicators, benchmarks, audits, sustainability standards and certification systems. In conformity with [Shaker \(2015\)](#), societies take advantage indicators as tools to deliver an exhaustive valuation of the present situation, estimate improvement and aid set for upcoming sustainable development objectives. The set of sustainability measures existing for measuring sustainable development is overwhelming to planners, researchers and politicians, thus an explanation of interrelationships, redundancy and spatial distributions is required.

Various systems and frameworks have developed globally for assessing the sustainability of a city, e.g., Monocle's Quality of Life Survey, Mercer's Quality of Living Ranking (Quality of Living Index), EIU's Global Liveability Ranking, European Green City Index, City Blueprint, European Green Capital Award, Global City Indicators Programme and Quality of Life Index. The bases for these assessment systems and frameworks for sustainable city development along with

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