City Quality Of Life Ranking

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***Abstract*—To determine a ranking of the best cities to live in based on quality of life from social, economic, and environmental parameters, both as absolute factors and by finding the relationships between them and their influence on each other.**
The purpose of this ranking is to provide a holistic and integrated view of a quality of life index, taking into account factors that have always been relevant, as well as those whose importance and influence has increased in the recent past.

***Index terms*—Cities, City ranking, Quality of Life Index, Maslow's Theory, Maslow's Hierarchy.**

I. Introduction

Cities represent complex, multicultural, and multi-dimensional social constructions, and their historic civilizing role is central for contemporary societies, as is their global economic articulation in networks through the "space of flows". Cities are engaged in a global popularity contest with a lot at stake. Each competes to be judged the happiest, the healthiest, the most liveable, or the least violent, to name but a few. Perhaps they also aim to win the title of "most reputable". Both the winners and losers become subject to media coverage in a positive as well as a negative light and also to public scrutiny. While the title of "Most Liveable City" may help attract the next wave of expats or foreign students, winning "Most Violent City" risks scaring tourists away altogether. In today's uncertain times, a label like this is enough to make people turn their backs on a city without a second thought.

For various reasons, cities aim at improving their competitiveness and their position in comparison to other cities. This comparison on one hand, can support stakeholders but on the other hand, can also be an important guide for future city development. Having realized these specific potentials of city rankings, policymakers increasingly make use of their results. Thus, city rankings have become an important empirical base for disclosing comparative advantages and sharpening specific profiles and consequently for defining goals and strategies for future development. Moreover, positive results in a widely published and approved city ranking can also be used as a central part of a city's marketing strategy as a top rank in a highly reputed ranking definitely helps to improve the international image of a city. As part of this process, city rankings reinforce the competitive perspective steering urban development; their placing focuses the strategic efforts of urban politics mostly on strengths, neglecting weaknesses. Hence, city rankings seem to have significant influence on both investors and political decision-makers.

A city ranking is enough to change people's opinions when it comes to choosing a city to live in, carry out a business in etc. Hence, a ranking like this becomes very important to solve the problem of determining the best city in terms of various factors. Our problem statement- "To determine a ranking of the best cities to live in based on quality of life from social, economic, and environmental parameters, both as absolute factors and by finding the relationships between them and their influence on each other" helps solve exactly that problem.

Most city rankings are the product of research conducted by international consultancies and agencies. Their methodology tends to rely either on traditional market-research opinion polls or on collecting and analysing a variety of city-related data. While both the methods help rank the cities effectively, it is also important to stay critical about the position of a city in any ranking. For example, a city might be infamous for crime amongst the media or the public but it is also possible that it might stand better in other socio-economic aspects and hence, it may on an overall scale, do better in ranking compared to other cities. Breaking stereotypes also becomes an important issue to solve; perceptions and reality are two different things.

These rankings of course have their downfalls- city rankings might tend to neglect complex interrelations and casualties. They are mainly discussed with regard to the final ranks, may threaten long-term development strategies, may tend to strengthen existing stereotypes and are commonly ignored by badly ranked cities. Hence, it is easy to get carried away with city rankings. Perhaps the most important consideration should be how a city's position in a ranking affects the quality of life of its residents; cities need to make wise use of these rankings, if they're to be for the benefit of their residents.

Hence, concluding, city rankings can offer a useful way to compare and contrast city performance. But to ensure cities benefit, their governments should only use the results to enhance their existing city development strategies. A ranking that publicly singles out a city's poor performance, for example, may encourage increased efforts by public authorities to improve the social and economic conditions. Or to put it another way: for the best chance of success, cities' responses to the rankings should be rooted in practical action that keeps the needs of residents firmly at the forefront.

II. LITERATURE REVIEW

A. Quality of life in the City, Quality of urban life or Well-being in the City [1]

Murgaš and Klobučník define quality of life as *'...the extremely complex and multi-dimensional concept of interrelated variables characterizing the idea of the good life and satisfaction with that, and how the life of an individual approaches this notion.'* The findings presented here divide the parameters that comprise quality of life into a good life and a good place, with focus on the former. There is frequent re-iteration of the unmeasurability of a good life as an absolute concept. This approach utilises random surveying of inhabitants and their opinions about the quality of life in a specific city, with classification based on gender, age, and level of education, inferring conclusions from the same.

This method utilises only the subjective aspects of the quality of life, and doesn't take into consideration concrete factors that are measurable about the place itself, i.e. objective and actionable parameters such as economy or environmental quality.

B. The Methodology of Calculation the Quality of Life Index[2]

A mathematical approach to evaluate the quality of life is taken. The formula developed calculates the aggregate of the product of values of indicators and the weightage given to each. It is acknowledged that weight assignment to different criteria is a challenge, and a psychological hierarchy is used to decide the same. Contrary to Murgaš et al. this method uses quantifiable parameters to derive an absolute score in identifying what makes a city's quality of life 'good'. Indicators of population taken into consideration include health status, employment rate, income status, and gender equality.

The method followed is similar to the one proposed in this paper as far as a weighted measure for absolute quality index is concerned. However, there are two subtle differences -

a. The parameters used are of more recent concern, such as environmental quality - given the rise in global warming and growing awareness of the same, this is an essential factor to take into consideration that may not have had as much influence in the paper in question.

b. The proposed objective does not stop at calculation. It is an absolute ranking of cities based on quality of life.

C. An Overview of Quality of Urban Life[3]

In line with Murgaš et al. quality of life is classified into two broad groups - objective (at the aggregate level), and subjective (at the individual level). However, consistent with Puskorius, it emphasises the importance of objective parameters in determination of quality of life. Identification of variables for each of the groups is first completed. The subsequent focus is on the relationship between them, and perhaps more significantly, the impact that each has on the other. About Geographic Information Systems, it is said - *'Data integration gives rise to the possibility of investigating many aspects of the relationships between contextual data and responses to survey questionnaires on QOL using bi-variate analysis and multi-variate statistical modeling.'* Hence, it is clear that there are methods to ensure that the inter-relationship of objective and subjective parameters, rather than being a fork in the path in research regarding measurement of quality of life, can be analysed together, leading to a more holistic calculation.

D. Defining the quality of urban life: Which factors should be considered?[4]

The well being of a person in a city is drastically influenced by its society. Capturing the variety of factors affecting mental and physical happiness, taking into account the multidimensional constraints of different environments have not been a standard in other comparative studies according to the authors.

The examination of "Quality Of Urban Life (QOUL)" has been done at a personal(subjective) level and at a larger, societal level, highlighting its relationship with the quality and accessibility of public services and space. The paper focuses on well-being governed by personal health, finances, education, available commodities, recreational services and quality of the surrounding environment, concluding with a generalised set of 12 factors that aims to assess the quality of life in European cities. The observations are deduced from a highly theoretical viewpoint without any mathematical or statistical basis to validate its conclusions.

E. Development and Quality of Life in Cities[5]

Peach and Petach create a mathematical index to quantify and compare economies as a function of factors influencing the economic development and quality of city life. Research is mainly focussed on the more populous statistical areas of the United States, targeting the "marketing and non-marketing benefits" as well as the economically active cities. The Metropolitan Development Index (MDI) is a mean of 3 main subindexes and the respective indicators within it, which all have equal weights posing as a limitation of this approach. Economic prosperity and an individual's preference of an economically beneficial metropolitan life is derived from correlation, tests and rankings of MDI indexes and relationships between GDP and general development as a whole.

F. Quality Of Life Ranking Of Spanish Municipalities[6]

This paper deals with the challenges faced in deciding relevant indicators and selecting appropriate tools to assess the quality of life in Spanish municipalities. Two main empirical obstacles are discussed, namely, collecting representative data and sensible aggregation of information. The data represented by the indicators must be common across municipalities including both its advantages and disadvantages for accurate analysis.

Data Envelopment Analysis (DEA) is a method to obtain an index of weighted inputs and outputs suited to handle multiple dimensions. Inputs are costs to be minimised and outputs are costs to be maximised. Value Efficiency Analysis (VEA) was developed to improve upon DEA, overcoming its limitations of low discriminating power over a small, multidimensional sample size. As a result, discriminating power was increased along with an increase in the conformity in the variable weights."Complete ordered ranking of quality of life" was achieved through superefficiency scores.

G. Ranking quality of life using subjective well-being data[7]

Indices ranking the quality of life in cities based on climatic, environmental and urban conditions have a long tradition in hedonic literature. However, authors have been employing subjective well-being measures to assess the impact of these amenities on individual welfare. This paper presents an alternative method of constructing quality of life indices. The paper uses SWB data in Ireland to rank the quality of life across three regions in three different ways- 1) using an unconditional average of SWB across locations 2) conditionally controlling personal characteristics of individuals and environmental amenities 3) weighing environmental endowments by the marginal rate of substitution between income and amenity. The results show a very high correlation between these three indices and suggest that variation in SWB across locations is not random, but is driven to a large extent by the endowment of location-specific amenities across locations.

This method is used only in those regions restricted to Ireland where the equilibrium condition inherent in the hedonic approach does not hold or where detailed housing and wage data are not available. Hence, the research cannot be generalized.

H. Quality of city life multiple criteria analysis[8]

This paper performs a comparison 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. The 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. The method presumes a direct and proportional dependence of the significance and priority of analyzed alternatives in a system of criteria that adequately describe the alternatives on the values and weights of those criteria.

The research is wholly focused on the INVAR method and its applications in city planning.

I. Quality of Life and City Competitiveness[9]

The paper focuses on how quality of life has been viewed as part of the profile of a ‘competitive city’; one that is successful in attracting the attention of capital, and the ways in which quality of life factors have been identified as influential in patterns of urban growth and development. In the second part of the paper, the discussion revolves around the use of quality of life as part of place promotion and city marketing and how that has placed most emphasis on a rather narrow conception of quality of life:, one that is place-based rather than people-based. The evidence of the research points to the fact that there are clear links between the attraction of capital and quality of life. The paper also concludes that the attractions of quality of life in the present phase of capitalism lies in its academic ambiguity
The observations are deduced from a highly theoretical viewpoint without any mathematical or statistical basis to validate its conclusions.

III. APPROACH

WHO defines Quality of Life as an “individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.”

Quality of life is a subjective measure of one's life, given a plethora of influencing factors. These factors or indicators vary drastically with minute changes in the environment. There are no standard models to accurately depict what an ideal life must look like due to happiness being a large underlying factor among the quantifiable ones. Happiness, also being a subjective matter, can be directly impacted by a human's basic needs and wants. We aim to classify or categorize the parameters of our dataset into the Maslow’s Hierarchy of Needs, to be able to index and rank the best liveable cities around the globe according to their Quality of life.

The original Maslow theory is conceptualized as a pyramid. The most basic needs for survival are at the bottom with each level progressing to the highest stage of intangible needs at the top. One can only progress to the next higher stage if the previous level requirements have been fulfilled. The pyramid has 5 such levels, addressing all factors perceived in everyday life. The first, lowest level, of psychological needs comprises components needed for basic human survival. They include food, water, shelter, health and reproduction. The second level of needs is safety. Safety is an umbrella term consisting of physical, emotional, financial and health-related safety. The third level of needs is social and emotional needs, stemming from relationships, family and bonds created within the society a person lives in. These needs are purely emotional and are needed for a sense of belonging in a larger group of people. The fourth, esteem needs are ego-driven needs. This level consists of two types of self-esteem; one based on respect and acknowledgement of others and the other based on your own self-assessment. The final level is about self-actualization which is needed to realise one’s full potential as a person. These needs include education, skill development, travel, learning a new language, cooking etc.

The essential concepts of QOL measures are subjectivity, multi-dimensionality and well-being. Since there is no standardized method of calculating QOL, we propose to evaluate and create an index based on a modified version of the Maslow Theory of Needs. We will be loosely categorizing the parameters of the dataset into 4 distinguishable levels. These parameters will have weights assigned to them in terms of their importance and calculate the final rank of cities with the highest Quality of Life index. This indexing is computed from 17 variables of our chosen dataset with 4 different levels carrying their respective weights, tested against each other and aggregated to rank the cities. Following Maslow’s Hierarchy we have ranked the 17 attributes as follows:

- Level one consisting of- Housing, Healthcare, Environmental Quality.
- Second level consisting of- Cost of Living, Business Freedom, Safety, Education, Economy, Taxation.
- Third level consists of startups, venture capital, travel connectivity and commute.
- Fourth level consists of internet access, leisure and culture, tolerance and outdoors.

III. DATASET

The dataset used has been obtained from Kaggle[10], and derived from Teleport[11]. There are 256 rows and 21 columns. The features of each attribute are as follows –

1. Housing – cost per apartment, rent
2. Cost of living
3. Number of startups
4. Venture capital
5. Travel connectivity
6. Commute
7. Business freedom
8. Safety
9. Healthcare
10. Education
11. Environmental quality
12. Economy – GDP
13. Taxation
14. Internet access
15. Leisure & culture
16. Tolerance
17. Outdoors – elevation, water access

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