LivabilityX: An Analysis of Trends in Global Urban Livability

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1. What is the project trying to do?

The project aims to develop a comprehensive Urban Livability Index that combines climate and socio-economic data to evaluate the livability of cities worldwide. It will track changes in livability over the years, assess the impact of global warming and increased carbon emissions on livable areas, and simulate potential geopolitical and social implications. Schindler and Dionisio (2024) have explored the integration of socio-spatial indicators in urban planning[1], highlighting the complexities of urban livability and the need for culturally relevant data and improved collaboration among stakeholders. Ruth and Franklin (2014) have examined the concept of livability as a key principle in urban planning and policy, highlighting its influence on public perception and infrastructure investment[2]. Our project aims to provide valuable insights for government policy, urban planning, and decision-making.

2. How is it done today; what are the limits of current practice?

Ahmed et al. (2019) critically review the concept of "livability," noting its broad application and inherent ambiguity in urban planning. They have concluded by discussing strategies to enhance livability in urban environments, including cities, towns, and neighborhoods[3]. Current livability assessments often rely on separate indices or non-integrated measures, making it difficult to capture a city's overall livability comprehensively. For example, the study by Wang et al. (2015) compared Beijing with other global cities using the Livable Level Integrated Index (LLII) and revealed gaps, particularly in environmental quality, which underscores the need for more holistic assessments that consider multiple factors over time[4]. Kutty et al. (2022) propose a novel machine learning-based framework combining metric-distance analysis and clustering techniques to evaluate resilience and livability in 35 European smart cities[5]. Tan et al. (2016) introduced the Global Livable Cities Index (GLCI), incorporating a broader range of indicators to account for economic competitiveness and diverse populations[6], but it could not still dynamically assess climate change impacts and emerging socio-economic trends. The study by Saeed et al. (2020) emphasized a more integrated approach by using the Analytical Hierarchical Process (AHP) to develop a composite index that accounts for disparities among cities[7]. Najafi et al. (2024) evaluate urban livability in District 1 of Tehran using GIS to analyze physical, socio-economic, and accessibility indicators at the urban block level[8]. However, they were limited to a specific region and did not fully capture global or climate-related factors. Benita et al. (2021) proposed a Spatial Livability Index for dense urban centers, which identified patterns based on geographical correlations but still did not address the dynamic, evolving nature of urban livability under climate change[9]. Tran et al. (2021) develop transportation livability-related indicators for a green urban road rating system in Taiwan[10]. However, the study's reliance on local conditions may limit its applicability to other regions, necessitating a more flexible framework to accommodate diverse urban contexts. Agbali et al. (2019) explore the implementation of smart city strategies through stakeholder perspectives in Manchester, Boston, and San Diego, highlighting the significance of social and technological innovations in addressing urban challenges[11]. Al-Maliki et al. (2024) propose an ICT framework for developing smart cities in Saudi Arabia, addressing the unique challenges posed by the region's religious and cultural context while identifying potential benefits and obstacles[12]. However, the proposed model may require further refinement to adapt to rapid technological change. Al-Hader et al. (2009) propose a modular smart city architecture focusing on using GIS to manage and standardize infrastructure data models for utility networks like electricity, water, and gas[13], but practical challenges in integrating diverse systems could hinder its effective

implementation across complex urban settings. Kalenyuk et al. (2024) analyze the impact of digital financial technologies on smart cities, categorizing innovations like payments, lending, investing, and blockchain while emphasizing the need for significant resources and collaborations to implement smart projects[14], but they caution that these advancements also introduce risks such as cyber threats and data protection challenges. Therefore, current practices are often fragmented, region-specific, or static, lacking a predictive, comprehensive, and adaptable approach that can effectively guide long-term urban planning and policy-making.

3. What's new in your approach? Why will it be successful?

As early as 1990, Pacione has reviewed the concept of urban livability, emphasizing the relationship between city dwellers and their environments[15]. Chourabi et al. (2012) proposed an integrative framework for understanding smart cities by identifying eight critical factors — management, technology, governance, policy, people, economy, infrastructure, and environment[16]. Our new approach combines both climate and socio-economic factors into a comprehensive Urban Livability Index, offering a more holistic view of city livability. It introduces predictive modeling to simulate the impact of global warming, carbon emissions, and socio-economic changes on future livability, which most existing indices lack. Its success lies in its ability to offer a more accurate, adaptable, and forward-looking tool that can assist policymakers, urban planners, and other stakeholders in making informed decisions for sustainable urban development.

4. Who cares?

The primary stakeholders who would care about this project include Government agencies and policymakers, urban planners, environmental researchers, real estate developers, investors, international organizations as well as city residents. As early as Abdoullaev (2011) has proposed a development model for intelligent cities, emphasizing eco-intelligent strategies that blend natural, social, technological, and digital capital[17]. Nam and Pardo (2011) conceptualized the smart city framework by identifying key dimensions of technology, people, and institutions[18], outlining strategic principles that emphasize infrastructure integration, social learning, and governance for effective citizen engagement.

5. If successful, what difference and impact will it make, and how do you measure them?

If successful, the project will provide a more accurate, comprehensive, and predictive tool for assessing urban livability, enabling governments, planners, and stakeholders to make better decisions for sustainable and livable city development. The impact will be measured by the adoption rate of our work, the comparative analysis, and the Stakeholder feedback, which means positive feedback and practical application outcomes from urban planners, researchers, and policymakers.

6. What are the risks and payoffs?

As for the risks, the first is data quality and availability. Incomplete or inconsistent data could affect the index's accuracy. The second is complexity in modeling. Developing an accurate predictive model for future scenarios may be challenging. The third is our uncertainty of stakeholder acceptance. Governments or organizations might be hesitant to adopt a new index, especially if it challenges existing norms.
The payoffs will include establishing a widely recognized, comprehensive livability index, which could become the go-to standard for assessing city livability worldwide. Another significant one is providing actionable insights that could lead to improved urban policies, climate adaptation strategies, and overall quality of life for city dwellers.

7. How much will it cost?

Due to the use of publicly available datasets, the cost of this project is minimal.

8. How long will it take?

The project will take approximately 2 months:

9. What are the midterm and final to check for success? How will progress be measured?

Midterm assessments will evaluate data quality by checking the completeness and accuracy of the collected data, as well as validating the model's reliability using selected cities. The final evaluation will involve comprehensive model validation by comparing the new index with existing ones, gathering stakeholder feedback on its practicality, and analyzing adoption rates, policy changes influenced by the index, and its effectiveness in decision-making.

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