

**Review of the Doctoral Dissertation of Iskander BEN RJIBA
titled „Decision-Support Approaches for Urban Climate Action Planning and
Environmental Assessment”**

The candidate prepared the dissertation within the framework of the Chemical Engineering and Materials Science Doctoral School under the supervision of Georgina Tóth-Nagy and Viktor Sebestyén.

Compared to the version presented at the preliminary defense, the candidate has taken into account the comments and recommendations I previously provided. The dissertation has been substantially improved and restructured into a coherent and consistent whole. The sections that were previously subject to criticism have been revised in an appropriate and satisfactory manner.

Significance of the Topic, Problem Statement, and Research Objectives

The topic of the dissertation is highly relevant and timely. With global urbanisation expected to reach approximately 68% by 2050, cities will play a central role in addressing climate change challenges. In this context, the dissertation identifies a clear research gap: although many cities have developed climate mitigation and adaptation plans, these remain highly diverse, fragmented, and difficult to compare across contexts.

The dissertation positions itself appropriately within this gap. Its main contribution is the development of a structured framework for categorising, analysing, and comparing climate actions at the urban scale. This is particularly important because existing research tends to focus on isolated sectors such as energy efficiency, transport, or flood management, while relatively few studies attempt to integrate these action types into a comprehensive analytical system.

The overall objective of the research—to develop an analytical and practical framework supporting cities in designing and evaluating climate strategies aligned with sustainable and resilient development—is clearly formulated and justified.

The dissertation is structured into four main parts that follow a clear analytical logic. The first part focuses on the categorisation of urban climate actions. Based on the analysis of 99 SECAP reports, the candidate applies text mining and exploratory methods to identify recurring patterns and develops a structured classification of climate actions. This provides a systematic foundation for the subsequent analyses.

The second part investigates the role of public awareness in urban climate action. Here, the research examines how awareness-raising measures and education levels relate to environmental outcomes. Using statistical analysis, the candidate explores the connections between public awareness, air quality, and emission indicators, highlighting the importance of social factors in climate strategies.

The third part presents the development of a data-driven decision-support model. Using a large dataset of European climate action plans, the candidate constructs a decision tree model that links city characteristics to recommended climate actions. This approach allows for the identification of suitable strategies tailored to different urban contexts and supports evidence-based decision-making.

The fourth part addresses the environmental impacts of construction materials used in climate action projects. It applies a life-cycle assessment approach to quantify material use and evaluate key

environmental indicators, such as global warming potential. The analysis compares different types of interventions and highlights the trade-offs associated with material choices, thereby contributing to a more comprehensive evaluation of climate actions.

The four research questions (RQ1–RQ4) are relevant and cover important dimensions, including public awareness, decision-support systems, and material impacts. The research questions closely connected to the 4 main research topic discussed in the dissertation.

Literature Review and Theoretical Background

Overall, the literature review demonstrates extensive reading, and it provides a comprehensive and well-structured overview of the existing research on urban climate change and climate action planning. It covers key thematic areas, including climate impacts in cities, urban governance challenges, the role of international initiatives such as the Covenant of Mayors, and the increasing importance of data-driven and computational approaches.

Research Structure and Organisation

A clear research plan and workflow diagram at the beginning of the dissertation helps the reader to identify the key challenges in the researches of the dissertation. The structure and organisation of the dissertation are clear, logical, and well aligned with the research objectives. The dissertation follows a coherent progression from problem identification through methodological development to the presentation and discussion of results. shows

Data and Methodology

The methodology section presents several strong elements. The data and methods applied in the dissertation are comprehensive, well-structured, and appropriate for addressing the research questions. The study is based on a combination of diverse data sources, including published SECAP reports, international databases, and project-level documentation, which ensures a solid empirical foundation. The methodological framework integrates several approaches, including text mining for the systematic analysis and categorisation of climate action plans, statistical analysis for examining the role of public awareness, and machine learning techniques—particularly decision tree modelling—for the development of a data-driven decision-support tool. In addition, the research incorporates a material-based environmental assessment using life cycle assessment (LCA) principles, allowing the comparison of environmental impacts across different climate action projects.

Results and Discussion

The results section presents several interesting findings, which are well supported with connected scientific publications.

Although connecting to the preliminary defense, I found the comparison between countries due to the differences in climate and development levels still weak. Although the comparison of the three countries (Germany, Brazil, and Kenya) provides an illustrative perspective on the relationship between climate conditions, education, and public awareness. Though, from a methodological point of view, this part of the analysis remains relatively weak. The small sample size, limited to only three countries, significantly constrains the robustness and generalizability of the findings. In addition, the analysis is conducted at

the national level, while the overall focus of the dissertation is on urban climate action, which introduces a certain inconsistency in scale.

Furthermore, the selected countries differ substantially in multiple socio-economic, climatic, and structural aspects, making it difficult to isolate the specific effect of public awareness or education on environmental outcomes. As a result, the observed relationships cannot be interpreted as causal, but rather as descriptive associations. Although the candidate appropriately acknowledges these limitations, the conclusions drawn from this comparison should be treated with caution.

Despite these weaknesses, this section still plays a useful role within the dissertation by highlighting the potential importance of social factors in climate action and by providing a conceptual motivation for the inclusion of public awareness in the broader analytical framework.

The part of the dissertation focusing on European cities and the application of decision tree modelling represents one of the core analytical contribution of the work. Based on a large dataset of urban climate action plans, the candidate develops a data-driven model that links city characteristics to the selection of climate actions. The use of European cities provides a sufficiently diverse and well-documented empirical basis, allowing for meaningful pattern identification.

Material-Based Climate Action Analysis

The most developed and convincing part of the dissertation is the analysis of environmental impacts based on construction materials. This section is well-structured, methodologically sound, and clearly presented.

The use of life cycle assessment (LCA) provides a strong analytical foundation, and the comparison between modelled and experimental results is particularly valuable.

Overall Evaluation of Research Contributions

Among the three research results, the second and third (decision-support tools and material-based evaluation) are well developed and scientifically convincing. The first (public awareness and environmental impact) is less robust and would require further refinement.

Overall, the dissertation contains valuable contributions but lacks coherence in its current form. It appears to combine several promising research strands that are not fully integrated into a single framework.

Final Recommendation

In conclusion, the dissertation addresses an important and relevant topic and contains significant scientific contributions, particularly in the areas of decision-support tools and material-based climate assessment.

I recommend that the dissertation be accepted for public defense, and—after a successful defense—that the PhD degree be awarded.

Budapest, 2026.06.28.

A handwritten signature in blue ink, appearing to read 'Pódör Andrea'.

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