



Fundamental Field: Engineering Sciences
Specialization: Civil and Building Services Engineering

HABILITATION THESIS

- ABSTRACT -

**Indoor environmental quality in public buildings:
holistic assessment, energy efficiency, and sustainability**

Assoc. Prof. Eng. Tania RUS, PhD
Faculty of Building Services Engineering
Technical University of Cluj-Napoca

**- Cluj-Napoca -
2026**



The Habilitation Thesis "**Indoor environmental quality in public buildings: holistic assessment, energy efficiency, and sustainability**" details the author's significant contributions in the field, previous research results and accumulated experience. As a graduate in Building Services Engineering and PhD studies in Civil and Building Services Engineering at the Technical University of Cluj-Napoca, the author has developed a solid foundation in understanding the systems governing Indoor Environmental Quality, including heating, ventilation and air conditioning installations, lighting and acoustics. This technical perspective is complemented by a holistic approach, integrating aspects of human physiology, energy efficiency and sustainability.

The Habilitation Thesis is structured in three main parts, reflecting a solid academic background and a clear vision for future development.

The Introduction presents the general framework of the research, the fundamental relevance of the topic and the objectives of the thesis, emphasizing the multidisciplinary importance of the field.

Scientific, professional and academic achievements detail the author's significant contributions to the field, previous research results and accumulated experience.

The author has demonstrated a constant commitment to research and science throughout her career, evidenced by her numerous publications. Published work includes 4 scientific books and approximately 50 articles published in recognized national and international journals and conference proceedings. Her work has attracted significant attention within the scientific community, accumulating over 80 ISI and BDI citations.

In addition to her publications, the author has won and led two research projects obtained through national and international competitions and an international co-operation project between higher education institutions. She was also part of the implementation team of national and international projects. The author has played an active role in mentoring and guiding future researchers by coordinating teams of students to participate in scientific conferences. Her contributions also extend to organizing scientific events or acting as reviewer for international journals and conferences.

On a teaching level, the author has dedicated herself to the training of students, aiming not only to deepen their technical knowledge but also to develop critical thinking. This has cultivated essential skills for system design, evaluation and optimization. A central aspect of this approach is the continuous adaptation of the course content to the latest international developments and the initiation of new courses at Master level.



In terms of institutional activity, the author has made a substantial contribution to the dynamics and development of the Faculty of Building Services Engineering. Her active involvement was manifested in the coordination of the bachelor study program evaluation, the supervision of a considerable number of bachelor and dissertation thesis, the promotion of the institution's image and the implementation of a new master's program in English "Building Services for Regenerative Cities".

This section also identifies the research directions and the three main areas on which the author's work has focused:

Chapter 1: "Indoor environmental quality - research directions".

Chapter 2: "Indoor environmental quality research in hospitals" - studies in healthcare facilities, exploring the specific challenges of historic buildings and presenting detailed indoor and thermal environmental assessments.

Chapter 3: "Indoor environmental quality in educational buildings" - addressing the specific context and challenges of these spaces, including indoor environmental quality assessments and thermal comfort analyses in the context of pandemic measures, as well as the interaction between indoor environmental quality, energy consumption and sustainability.

Chapter 4: "Sustainability and energy efficiency of buildings" - broadening the perspective on the energy and environmental impacts of buildings, analyzing renewable energy sources, the impact of installations and strategies to reduce the institutional carbon footprint.

Career development plans and future perspectives outline future research directions, academic and professional goals in the medium to long term, demonstrating a clear vision for continued development in the field. This part includes:

Chapter 5: 'Future research directions' - outlines future research directions focused on deepening and extending knowledge in the field of indoor environmental quality and building sustainability, including advanced concepts such as Positive Energy Buildings and Positive Energy Districts.

Chapter 6: 'Teaching career development plans' - presents the author's strategies for developing an excellent academic career by guiding innovative doctoral research, training high quality specialists for the labor market and promoting sustainability and innovation in the field

Chapter 7: 'Scientific career development plans' - details future research initiatives, which will be founded on the principles of professional integrity. This includes combating plagiarism and ensuring honest and impartial experience transfer and technical advice.



Chapter 8: "Institutional career development plans" - addresses the author's contributions to developing the department, promoting the image of the institution and the faculty. By promoting the values of respect and collaboration, the author aims to strengthen the identity and unity of the academic community.

Chapter 9: "Final conclusions" - summarizes the main conclusions of the thesis and opens new perspectives.

With this thesis, the author aims to demonstrate her scientific maturity and ability to coordinate large-scale research activities and to train new generations of specialists. The thesis makes a significant contribution to informing decisions on the design, rehabilitation and operation of public buildings to achieve high standards of indoor environmental quality, having a positive impact on health, productivity and energy performance, and reinforcing the position of indoor environmental quality as a fundamental pillar of sustainable development and public health.

The end of the Habilitation Thesis includes the part of bibliographical references used in the thesis, the list of figures and tables, appendices, as well as the list of the author's scientific works.