



**Universitatea  
Transilvania  
din Braşov**

# **HABILITATION THESIS**

## **SUMMARY**

**Title: Reduction of the impact produced by vehicles on the environment**

**Domain: Automotive Engineering**

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**University: Transilvania University of Brasov**

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This paper presents the candidate's achievements in the field of assessing and reducing pollution from motor vehicles. The paper includes the studies and results of the research undertaken by the author after obtaining the title of doctor at the Transilvania University of Braşov. A large part of the research activity was carried out within the Research Center for High Tech Products for Motor Vehicles, within the Research and Development Institute of Transilvania University of Brasov. Using infrastructure and human resources, in recent years the author has contributed to the formation of a team of researchers with whom he has produced scientific results, some of which are used at the level of the local community.

The present paper consists of two main sections. The first part is an objective analysis of the results of experimental research in the field of assessing and reducing the impact of pollution from motor vehicles. The second part presents future directions of research and professional development in the evolutionary context of the study programs specific to Automotive Engineering.

Section (B), Scientific and Professional Achievements and Career Development Plans is structured in two parts. Section (B-i) - "Scientific and Professional Achievements" is the most intensively treated, being structured in an Introduction and four chapters. The introduction includes information about the author's scientific, didactic, managerial activity and scientific affiliations. The four chapters present studies and research activities in the fields of pollution produced in the transport sector and sustainable urban mobility. The main objective of the research is to identify strategies to reduce the impact of the transport sector on the environment. At the beginning of each chapter, its origin is presented, using references to the studies carried out by the author and included in the bibliography section, as well as references to the works and projects that partially or totally financed the research activities.

Chapter 1 presents studies and research aimed at assessing pollution from motor vehicles. A first introductory part presents the effects of pollution produced by road transport on the health of the population, followed by the presentation of the methods of evaluation: air pollution, noise pollution and pollution produced in the urban environment, on board motor vehicles. The chapter presents the research results from several scientific

papers and from the research project "Thematic Trail Trigger – Three T" – Pilot Project "Quiet Areas as a Tourist Attraction".

Chapter 2 presents information on the assessment of the impact of transport activities on the quality of life in metropolitan areas. The results of the research within the scientific projects that were the basis for the development of strategic documents are presented, such as: Climate and Sustainable Energy Action Plans; Sustainable Urban Mobility Plans; Strategies to reduce the impact of the transport sector on the quality of the environment. Information is structured from the research projects: Sustainable Energy Action Plan - Săcele Municipality - Transport, Study for the implementation of the Sustainable Urban Mobility Plan of the city of Nădlac, the Sustainable Urban Mobility Plan of the city of Ghimbav, the Sustainable Urban Mobility Plan of the city of Cajvana and the scientific works related to them.

Chapter 3 presents directions for action to reduce the CO<sub>2</sub> footprint produced by the operation of motor vehicles. The 5 sub-chapters present: actions to reduce carbon emissions in motor vehicles; elements related to the use of alternative fuels; actions at the level of urban and extra-urban public transport; the use of electric vehicles; and actions to popularize and make accessible non-motorized transport solutions. Scientific papers relevant to the topics analyzed and the results of the research grant, System for reducing the concentration of carbon dioxide in exhaust gases of thermal engines, are presented.

Chapter 4 assesses the impact of urban mobility measures on the reduction of CO<sub>2</sub> emissions produced by motor vehicles. The chapter presents the need for the involvement of the academic environment together with the authorities and civil society in the formulation of measures and considerations regarding the choice of measures in accordance with the characteristics of the region of implementation.

Section (B-ii), Career Development and Development Plans, presents a proposal for the development of the author's teaching and research career. The second part presents the directions to be followed in the coming years by the author.

The main directions of academic development pursued are: the use of teaching methods centered on learning through discovery, team learning and group learning for students from bachelor's, master's and doctoral programs; ensuring the continuity of the

publication of teaching materials for students and support materials for doctoral students; developing fundamental theoretical skills and knowledge in the field of Automotive Engineering; participation in projects with a teaching purpose; attracting young people capable and willing to pursue a university career in the field of Automotive Engineering.

The main directions of scientific development pursued are: publication of scientific articles in journals with impact, in the field of Automotive Engineering; publishing books and scientific materials; accessing funds from national and international projects; attracting young researchers to carry out doctoral theses in the field of Automotive Engineering; continuing to collaborate with local authorities and civil society through scientific research projects; involvement of students and doctoral students in scientific research projects; coordination of doctoral theses in the field of Automotive Engineering.

In the last section, (B-iii) the selective bibliographic list that was the basis for the elaboration of the habilitation thesis is presented.

**Brasov, 8.10.2024**

**Prof.dr.eng. Stelian ȚÂRULESCU**