



Main field: Engineering Sciences

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HABILITATION THESIS

- ABSTRACT -

**Innovative Products and Methods with Application in
Engineering and Management**

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The habilitation thesis entitled "*Innovative Products and Methods with Application in Engineering and Management*" presents my main scientific, professional, and academic achievements which followed the completion of the doctoral degree in 2008, as well as my plans of professional growth and career development.

The first part of the thesis, "Scientific, Professional and Academic Achievements", is divided into three chapters, which are summarized below.

Chapter 1, "Artificial Neural Networks, Field of Artificial Intelligence, with Applications in Engineering and Management", provides a short history of artificial neural networks, complemented by important aspects of neural calculation. Chapter 1 is mainly dedicated to the description of the achievements which I found relevant for my activity within the field of artificial neural networks, based on a number of 15 scientific papers, 2 patents, 1 book, 2 laboratory guides, as well as teaching activities within the framework of a lecture on Artificial Intelligence.

Chapter 2, entitled "Intellectual Property. Industrial Property", consists of a concise overview of intellectual property, with a focus on industrial property. The chapter centers upon the description of my most significant achievements within the field of industrial property. They can be listed as follows: industrial property counselor for "Patents" and "Trademarks and geographical indications", member of the Romanian National Chamber of the Industrial Property Counselors, co-author of a book, 8 scientific papers, coursebooks and application within subjects of the curricula of study programs at undergraduate and master's level.

Chapter 3, entitled "Studies on the Realization of Innovative Products", shows the research activities completed within projects that had as an aim setting the scientific and experimental basis of the development of new products. These projects were completed within partnerships between Technical University of Cluj-Napoca, on the one hand, and companies within the economic environment or other research organizations, on the other. The author of the current thesis is the project director of two contracts and the project coordinator of two other projects.

The results obtained so far in terms of the above-mentioned projects include the publication of 15 scientific papers, out of which 11 were co-authored by the author of the current thesis, 2 national patent applications which are under examination, 1 prototype of a sofa side part made of composite and the mold necessary to thermoformation, the development of the operating material of the Technical University of Cluj-Napoca, and contribution to the professional development of researchers within this field.

The second part of the thesis, entitled "Plans Regarding Professional Growth and Career Development", makes reference to the research venues to be developed as part of my career development. The main topics that I would like to approach and deepen belong to the area of teaching and professional and scientific research.

In terms of improvement of my teaching abilities, I plan to develop and update the contents of the subjects that I teach so that they include the latest aspects within the areas of relevance, connect the topic of the applications to real-life situations, as understood through the collaboration with the economic environment, identify opportunities of introduction of new disciplines in the curriculum, and make use of the experience gained during the activities completed throughout the period with Covid-19 virus restrictions, in the sense of combining on-site activities with the on-line ones.

As far as my plans of scientific development are concerned, I aim to add to my current interests topics such as the use of neural calculus in the applications of image analysis within

the field of composite materials, as well as topics that belong to the area of data analysis and data science, with applications in the field of business management.

From a professional point of view, I plan to acquire new abilities within the field of neural calculus, of databases that integrate data characteristic of machine learning, of optimization of the methods with applications in the production management, as well as in the field of intellectual property.

The last part of the thesis, "Final conclusions", briefly revises the entire content of the current thesis.