

## SUMMARY

The present habilitation thesis contains a summary of the author's scientific and professional achievements after obtaining her doctoral degree as well as the proposal for future academic career development.

The habilitation thesis entitled "Modern processes and techniques used in environmental protection" is performed around the main achievements that can attest the author's ability in developing and coordinating scientific research activities in the field of Environmental Engineering with emphasis on modern processes and techniques used in monitoring the quality of environmental factors and processes as well with some techniques used in the materials processing.

The thesis is structured in three sections that highlight, one by one, the development of the academic career and representative results from the research activity. In the last part is presented the development career plan.

The first section presents the educational and professional achievements and the correlation of the scientific activities. Both teaching achievements and academic contributions have been highlighted.

The second section covers the most representative results of scientific research activities, which are structured along two main directions.

For the first research direction, the scientific activity was oriented towards the study of environmental quality monitoring procedures and techniques. This direction was developed to evidence the direct links between pollution sources and factors, the influence of pollution on the environmental factor's quality and the identification of sustainable consumption patterns in order, to promote the concept of environmental protection. In addition to scientific publications, presentations at conferences can be mentioned the coordination as director/manager of 12 contracts with economic agents, participation as a member in an international project, 15 contracts with economic agents, all activities with some applications in environmental engineering domain.

The second research direction was developed based on the PhD thesis subject, respectively the optimization of the shredding process of agri-food products. The research was mainly oriented to the texture study of different types of materials and the energy consumption in the shredding of products with different textures. The research was oriented to identify the product's characteristics with different textures in the shredding process, using different methods: texture analysis method, breakage test method, torque method; analysis method using heated metal wires. Related to the study of energy consumption in the shredding of products with different textures, the research carried out aimed to determine energy consumption by developing Rittinger's equation for hard textured products and Kick's relation for soft textured products. The results of the research have been disseminated by publishing scientific papers in ISI/BDI journals and conferences participation.

The third section contains the professional, scientific and academic career development plan. The scientific research activity will be developed considering the previous work and will be oriented towards to find concrete solutions to actual problems related to the socio-economic and environment correlations as: developing new methods and techniques for monitoring environmental factors;

identifying and evaluating the possibility of using environmentally friendly products in industrial processes (environmentally friendly products, green products); evaluating the life cycle of products with by increasing their life cycle and reducing their environmental impact; extending research on the shredding process to other types of materials (frozen, baked state) and under different working conditions (ultrasonic cutting, immersion cutting); determining the environmental and economic sustainability of products with different textures. Research results will be valued through: articles publication in scientific journals (ISI, BDI); publication of books in recognized publishing houses; participation at scientific conferences and papers publication in their proceedings.

In terms of teaching, the aim is to increase the quality of teaching activities, to use modern teaching methods, to continuously update the content of the subjects in line with the requirements of the labour market and technical progress, to increase students' awareness of the importance of lifelong learning. I graduated in 2000 the University of Bacau, Faculty of Engineering, specialization: Technological Equipment for the Food Industry, long term (5 years - 1995 - 2000). In the period 2000 - 2002 I attended postgraduate master courses at the same institution, specialization: Industrial Production Management, module Environmental Protection and Management in Industry.

At the same time as my master's studies, I started my doctoral studies (in 2000) at the Faculty of Mechanics, Technical University "Gheorghe Asachi" of Iasi, in the field of Mechanical Engineering, under the supervision of the prof.phd.eng. Vasile Neculăiasa. The doctoral studies were completed with the public presentation in 2008 of doctoral thesis entitled "Research on the optimization of the shredding process of agri-food products".

Between March to May 2004, I carried out a research internship at the University of Parma, Italy, were I performed some advanced research in the field of texture analysis of products with variable texture.

I started my academic career in 2000 by taking up a position as a preparatory lecturer at the Department of Process Engineering, Environmental Engineering and Physical Engineering (UPIMIF), Faculty of Engineering, University of Bacau. Subsequently, I was a university assistant (2002-2007) in the same structure.

From 2007 to 2014 I held the position of Head of the Department of Environmental and Mechanical Engineering (IMIM), Faculty of Engineering, Vasile Alecsandri University of Bacau. Since 2014 I am associate professor, position occupied by competition, in the Department "Environmental Engineering and Mechanical Engineering (IMIM)", Faculty of Engineering, "Vasile Alecsandri" University of Bacau.

In the teaching field, I have been working in the Mechanical Engineering domain, undergraduate programs Technological Equipment for the Food Industry / Industrial Process Equipment (EPI); and the Master's degree programs Management and Optimization of Process Equipment (MOEP), as well as in the field of Environmental Engineering, the undergraduate programs Industrial Environmental Engineering/ Industrial Environmental Engineering and Protection (IPMI) and the Master's degree programs Management of Environmental Protection in Industry (MPMI). The subjects in which I carried out teaching activities (lectures, seminar, project, laboratory) were: Machinery and plants for the food industry; Environmental impact assessment; Environmental management systems auditing; Industrial environmental monitoring; Equipment and installations for the prevention of environmental

pollution; Environmental engineering and protection in industry; Modern environmental monitoring systems; Environmental quality and safety.

The activity in these disciplines materialized in: carrying out the educational process (teaching hours: lecture, seminar, laboratory, project, consultations), evaluation activities (colloquium, exams); tutoring activities: undergraduate work; dissertation work; supervision of doctoral students in internship; scientific and methodical training activities and other activities in the interest of education (development of teaching materials for course, seminar, laboratory, participation at conferences).

The teaching activity has also materialized in the publication as author and co-author of 14 specialist books, book chapters and courses for students.

The main areas of research were oriented in two directions: modern processes and techniques used in environmental monitoring; modern processes and techniques used in materials processing.

The results of the scientific research activities are evidenced by scientific articles published in scientific journals and volumes of important scientific events with themes orientated to Environmental Engineering. The researches activities can be summarized by:

- 67 ISI articles: 14 articles as main author/corresponding author
- 50 articles published in BDI-indexed journals;
- 35 articles published in international conference proceedings;
- 50 research contracts with industry (of which 15 as project leader);
- 4 research projects/ grants (member, of which one international);
- 19 national development projects (member).

The visibility of my research work at national and international level is supported by the Hirsch index: h-index Scopus IS = 9, h-index Web of Science ISW = 9, h-index Google Academic IGS = 9 and a total of 193 citations (excluding self-citations).

The activity carried out at the "Vasile Alecsandri" University of Bacau, in particular, at the Faculty of Engineering and in the IMIM Department, has also oriented to some collateral actions as: year tutor, responsible for quality management in the IMIM Department, member of the Council of the Faculty of Engineering, member of the University Senate, member of the University Board of Directors, Director of the Management Department (2009 - 2016), Vice-Dean of the Faculty of Engineering (2016 - 2020), Dean of the Faculty of Engineering (2020 - present).

The results of the professional and scientific activity will aim to develop the field of Environmental Engineering, establishing new collaborations with the socio-economic sector and increasing international recognition.