

SCIENTIFIC RESEARCH AT THE UNIVERSITY OF PETROSANI

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1. Background

The activity of research and development at the University of Petrosani, further called *scientific research*, is carried out in accordance with the specific stipulations contained by the existing legislation, by the *Chart of the University of Petrosani*, the *Regulations concerning scientific research* as well as by the operational procedures and the *Ethics Code regarding the scientific research at the University of Petrosani*. All these observe both the national standards of research evaluation and the policies of research and development at a European level.

The directions and fields of scientific research have been settled according to the priorities that come out of the Strategic Plan and the mission of the University of Petrosani and of the Research Strategy of the University, developed in accordance with the national priority directions and international policies, while observing CDI's Strategy for the period 2007-2013, the 7th Framework Program regarding Research and Innovation of the European Board, and the Framework Program Horizon 2020.

Horizon 2020 is the largest research and innovation program of the European Community, owning about 80 billion Euros as available funds, during a period of over seven years (2014- 2020); besides these funds, it is going to attract amounts coming from private investments, as the program is open for all those who carry out activities of research, development and innovation. Its goal is to be sure that Europe provides worldwide-acknowledged science, while eliminating the obstacles innovation confronts with and making easier the interaction between the public and the private sectors with a view to collaborating in order to produce innovation.

Through the merging of research and innovation, Horizon 2020 attempts at supporting the materialization of its goal that emphasizes excellence in science and in the peak industrial domains as well as the approaching of society's challenges. The program envisages the setting forth of a large number of innovating ideas, discoveries and new projects through promoting the important ideas of laboratories and guiding them towards the market.

Under such circumstances, there are important opportunities for all the researchers of the University of Petrosani to express themselves through developing national and international

collaborations according to their level of competences and to capitalize their results and new ideas. Besides the financial component, which has, unfortunately, become minimal in universities, research may bring professional and personal satisfaction.

2. Research structure and resources

The scientific research of the University of Petrosani is a component of the educational process and is carried out owing to the material, human, financial and management resources settled accordingly. Scientific research develops along the following levels: fundamental research; applicative research; technological research; planning, expertise, scientific consulting, laboratory analyses and experimental determinations.

The institutional capacity of the university to organize and support the activity of scientific research and to transfer the results of research to the social and economic environment is proved by its research infrastructure, which, gradually grew both from an organizational point of view and from the point of view of the endowment with research equipments.

Accordingly, during the period 2012-2015, two research laboratories were authorized or re-authorized - as they bring a significant contribution owing to the transfer of the research results to the market (economic milieu), while finding solutions to issues belonging to the economic environment – as well as certain research centres accredited at a local level owing to decisions of the University's Senate. The research laboratories accredited or authorized at a national level are the following ones: the **Laboratory of Analyses and Trials in Constructions** and the **Laboratory of Research and Trials of Materials, Elements, and Structures in Constructions**. The *Laboratory of Analyses and Trials in Constructions* represents a research structure of the Department of Mining Engineering, Topography, and Constructions of the Faculty of Mines. It was authorized by the State Inspectorate in Constructions, during the period 2009 – 2013, and, beginning with year 2013, it was granted the 1st degree definitive authorization, according to Authorization no. 2846/04.12.2013. The *Laboratory of Research and Trials of Materials, Elements, and Structures in Constructions* is part of the Department of Mechanical and Industrial Engineering and transports and owns a 1st degree authorizations issued by the State Inspectorate in

Constructions, according to Authorization no. 3023/24.06.2015 issued in order to carry out laboratory trials and verifications. A **Laboratory of Nuclear Physics** also functions according to the authorization issued by the National Board for the Control of Nuclear Activities (CNCAN).



Fig. 1 *The Laboratory of Analyses and Trials in Constructions*

Seven research centres, out of which four previously owned a CNCSIS national accreditation, were locally accredited, at the University, through decisions of the academic Senate, as follows:

1. Engineering of rocks, useful mineral substances and construction materials (IRSMUMC)
2. Evaluation of risks in industry (CCERI)
3. Mining engineering (CCIM)
4. Methods, techniques and software for monitoring and controlling mining processes (MCPM)
5. Economic and social researches for regional development (CCESDR)
6. Mechanic engineering for extractive industry (IMIE)
7. Centre for Interdisciplinary Research in Mathematics, Informatics, and Physics (CCIMIF).

The acquiring of equipments and computer technique continued with a view to provide the necessary stuff for the laboratories of thermodynamics and topography, through funds coming from research, as well as the acquiring of software and other equipments whose price represents 80,513.66 Lei, sourced in POSDRU projects in course.



Fig.2. *The Laboratory of Research and Trials of Materials, Elements, and Structures in Constructions*

As far as the human resources are concerned, the University of Petrosani employs 169 persons as members of the teaching and research staff, 90 persons employed as auxiliary didactic staff and a rich human resource represented by the students registered at the three forms of academic studies: license, master, and, especially, doctoral studies. Consequently, the University of Petrosani owns a material and human resource that is able to attain the objectives settled by the research and development strategic plan and might compensate for the shortage of budget financing the university has to face.

The management of research activity is organizationally provided by the Scientific Research and Projects Management Vice-Rector and by the Department of Research, Projects Management, and Technological Transfer (DCMPITT) that are monitored the specific boards functioning at the level of the University's Senate and the Faculties' Councils. The activity of DCMPITT, under the supervision of the Scientific Research and Projects Management Vice-Rector, resulted in the data structuring concerning the research activity on the University's site and its permanent updating, which is both functional and active both at the level of the periodical publications and symposiums and at the level of the data concerning the important events and the providing of the feedback given by the social and economic medium.

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The evaluation of the quality of the scientific research of the University concerns:

1. The capacity of attracting funds for the activity of scientific research;
2. The capacity of training highly qualified human resources for scientific research;
3. The relevance and visibility of the results of the activity of scientific research;
4. The capacity of the academic staff to conceive and develop innovative products and technologies for the business milieu;
5. The institutional capacity of the academic staff to organize and support a performing scientific research.

These indices were quantified and positively considered by the internal institutional evaluation report during year 2015 and considerably contributed to the granting of ARACIS certificate for the University of Petrosani.

3. Results of the activity of research, development, and innovation

The participation of the University of Petrosani in the obtaining of grants owing to CDI national and international programs has always represented an important objective, which resulted in a series of partnership proposals within national and European

programs (PNII, CNCS) in accordance with the priority fields settled by the University of Petrosani through its *Research Strategy*. The proposals of international projects entered the European network, which promotes research programs in the field of raw materials - ERA-MIN – and the program financing the coal and steel research programs – RFCS, during the period 2013-2015. Out of these proposals, the research project PN-II-PT-PCCA-2013-4-0529, *Competitive Technology for the support of underground mining excavations observing the parameters of high performance in the exploitation and use of coal to produce energy (TCSEMAPR)* as well as an international project as partner in the RFCS program have been implemented.

Getting the international grant called “CROSS-EUROPEAN BLENDED LEARNING OF PART-TIME STUDENTS”, in 2014, in the field of social assistance education, where the University of Petrosani is a partner through the international network of social assistance – *Adult Life Long International Social Work (ALLISW)*, coordinated by the University of Jyväskylä, Kokkola University Consortium Chydenius, in Finland.

The University of Petrosani took part in the management team of two events financed owing to European funds through *COST 281/2009* program, in Brussels.

The projects and research contracts concluded with representatives of the economic milieu, during the period 2011 – 2015, are displayed in Table 1.

It should be mentioned the increase of the incomes based on research registered by the University of Petrosani, during the period 2011 – 2015, which is displayed in Table 2.

Table 1. Report of research contracts

Objectives of research	2011	2012	2013	2014	2015
Applied scientific research	25	35	30	20	30
Experimental scientific research	75	65	70	80	70

Table 2. The increase of the incomes based on research registered by the University of Petrosani

Index [Lei]	2011	2012	2013	2014	2015
Research incomes	204.350	397.958	798.628	312.711	1.274.795
Research expenditures	555.362	409.969	805.570	535.432	992.533
Administration expenditures cashed by research contracts	99.553	28.371	137.233	59.106	176.785

Table 3. Results of quantified research activity

Index	2011	2012	2013	2014
Number of articles published in ISI magazines or volumes	52	72	121	76
Number of required-given patents		5	3	1
Number of works shared on the occasion of international scientific events	88	94	84	119
Number of articles published by BDI magazines	178	156	131	113
Number of books/ books chapters	65	62	52	55

The relevance and visibility of the results of the activities of scientific research is monitored owing to ISI articles, works published in the volumes of conferences and foreign magazines belonging to the main flux of publications, in BDI indexed magazines and in those issued by international professional societies. The results of research activity have been disseminated through the publishing of articles and knowledge transfer to the economic milieu owing to invention patents, which are displayed by Table 3.

On the whole, the research activities carried out during the hereby period determined the increase of the quality of the results of scientific research.

The quality of research should match the shift of mentality towards a qualitative quantification that is able to identify the issues having been settled as well as the manner such issues have been settled, and not only the number of the solved issues. It is important to set forth the impact of research in prestigious publications and not in side-journals as well as the applicative impact of research once entering the economic milieu. The system of scientific quantifications, which analyses the quantitative aspects of generating, transmitting, and using scientific data, with a view to contributing to the understanding of the mechanism of scientific research, nonetheless, determined the coming out of certain anomalies concerning the evaluation of quality within the research system. Accordingly, frequent instances of over publishing the same stuff or team publishing have occurred, in order to multiply the publications of an author. All these anomalies should be settled with a view to determining an accurate and decent functioning of the system.

An important aspect of research at the University of Petrosani is the organizing of scientific events, which established a powerful connection with the academic environment in the country and abroad and with the social and economic milieu as well.

The symposium called *Universitaria SIMPRO* has become a periodical scientific event that supports the strategy of research, development, and innovation of the University of Petrosani and promotes the results of the scientific research afferent to the license, master and doctoral studies of the university. The University of Petrosani, in collaboration with INCD INSEMEX Petrosani, as a co-organizer, develops peak research in the field of Mines, Petrol, and gas and connected domains; it organizes scientific events in order to disseminate the results of researches towards specialists in the country and abroad, displaying opportunities of collaboration and knowledge transfer.

The traditional scientific event, *Universitaria SIMPRO 2014*, organized by the University of Petrosani, was carried out under the auspices of the Academy of Technical Sciences in Romania and of the General Association of the Engineers in Romania, in partnership with the economic milieu. Owing to the efforts of the organizing and scientific committee, the 2014 edition welcome the presence of prestigious researchers and members of the academic staff belonging to universities and institutes of research and development in *Canada, Germany, Italy, Turkey, Great Britain, Ireland*, and Poland, who presented their works.

The symposium *Universitaria SIMPRO 2012* had as a goal the integration of the scientific community of the University of Petrosani within European and worldwide research through the participation of a series of representatives belonging to universities abroad (*Germany, Italy, India, Serbia, Bulgaria and Czech Republic*) and the publication of the results of foreign researches. The scientific debates as well as the 108 works displayed according to 10 sections marked new directions of research and opportunities of collaboration and participation in consortiums or partnerships to the research programs of the European Union.

The University of Petrosani took part in the organizing of the International Symposium *SESAM 2013* and *SESAM 2015* together with INCD INSEMEX Petrosani, as a co-organizer; the event mainly concerned debates in the field of labour security and health and the publication of a series of works in an ISI indexed magazine.

In September 2015, the University of Petrosani organized the international mining Congress *BALKANMIN 2015*, which represented an opportunity for the meeting and scientific debates of the representatives of the Balkan universities specialized in the capitalizing of natural resources.

Beginning with 2012, the University of Petrosani, owing to its participation in signing the *Memorandum* founding the international forum, became a founding-member of the *World forum of universities of resources on sustainability* WFURS at TU Bergakademie Freiberg- Germania. The University continued to participate in the yearly meeting of the Forum, in 2013, at the Norwegian University of Science and Technology Trondheim - Norway, in 2014, at Montanuniversität Leoben, Austria, where the University of Petrosani displayed the poster entitled "Landmarks and achievements of the activity of research and development of the University of Petrosani".

We should also mention the continuation of the positive relations of collaboration between the university of Petrosani and the Mine University in

Moscow, owing to the participation in the yearly International Conference entitled “*Miner’s week*” organized by the National University of Science and Technology in Moscow, during the period January 28th and January 31st 2014, which was also an opportunity for the meeting at the International Centre of Scientific and technologic Information *ICSTI*. *ICSTI* is an inter-governmental organism where Romania is a founding member, beginning with 1969, and it cooperates with over 30 states worldwide.

ICSTI’s objective is to provide information, analytical, consultative, and organizational support for the international cooperation in the fields of science, technology and business. It is worth mentioning that Romania is represented at *ICSTI* by ANCSI and the University of Petrosani. For years, the full representative of Romania at *ICSTI* had been Professor Nicolae Iliăş, who is, at present, a partner-member of *ICSTI*. At the moment, the full representative of Romania is Professor Ioan Ştefan Groza, while the representative of the Focal Point – University of Petrosani is Professor Victor Arad. In the meeting held on October 2015, in Vietnam, took part a delegation that also included Professor Nicolae Iliăş.

The University of Petrosani was represented on a governmental level, on behalf of the Ministry of National Education, at UNO’s Economic Board for Europe, on the occasion of the meeting of the work group that debated the use of clean energy from fossil fuels - 10th Session Group of Experts on Cleaner Electricity Production from Fossil Fuels (21st October 2014) Salle VIII, Palais des Nations, Geneva, at the 9th Session Group of Experts on Coal Mine Methane that concerned the emissions of methane in coal mines, which was held in October 2014, and at the mutual meeting of UNECE and the subcommittee for coal - *Global Methane Initiative* (22nd – 23rd October, 2014), Salle XI, Palais des Nations, Geneva.

We should also mention the participation of the University of Petrosani as a scientific sponsor of five international symposiums within the WSEAS Conferences, in 2013.

The University of Petrosani also organized an invited session, “*Mineral resources, Energy and Sustainability*”, within the 13th edition of *GeoConference SGEM2013*, Albena, 2013, which has appeared to be quite interesting for the academic staff of the University for several years.

The University of Petrosani participated and co-organized, together with the University of Technology in Czestochowa, Poland, the Faculty of Management, "1 Decembrie 1918" University in Alba Iulia, the Centre for Career Informing and Counselling, and the International Centre of

Research in Higher Education and Cooperation, in the second edition of the International Conference entitled “*Career Management in a Knowledge-Relying Society*”, which was held at the University of Technology in Czestochowa, Poland. The results of these contacts materialized in the perfecting, at the beginning of October 2014, of the Agreement of Cooperation and of a specific agreement of collaboration within EASMUS + programme.

The University of Petrosani took part, as an official partner, in the organizing of the international conference entitled ***The Power to Be Different***, carried out in Timisoara, between October 30th and 31st, 2014, and organized by the University of the West in Timisoara, the Department of Social Assistance of the Faculty of Sociology and Psychology and WorldTeach Association, with international partners (Universita degli studi di Genova; Montpellier University, Open Research Centre for International Applied Research Studies of Innovations in Communication ORC IARSIC, Christian Political Foundation for Europe etc.) and national (National library of Romania, "Alexandru Ioan Cuza" University in Iaşi, “Transylvania” University in Brasov, "Eftimie Murgu" University in Resita, the National College of Social assistants in Romania, etc.).

The visit that the ambassador of the Islamic Republic of Iran in Romania – **His Excellency Dr. Bahador Aminian Jazi** – paid to the University of Petrosani, on May 12th, 2014, focused on carrying on a collaboration in the academic field.

The University of Petrosani was the host of a meeting on the occasion of the visit of Mr. **Amos Carmeli, President of Perach Association at Weizmann Institute of Science**, Rehovot, Israel, on February 20th, 2014.

In March 2013, the University of Petrosani hosted a scientific event organized by the Embassy of Canada in Romania, in partnership with the University of Petrosani. The objective of the event was the conference held by **His Excellency, Philippe BEAULNE**, the Ambassador of Canada, concerning “*Corporatist social responsibility in the field of exploiting natural resources and providing a durable development*”.

A series of research partnerships have been concluded with the Academy of Mines in Sankt Petersburg, the University of Mines in Moscow, the university of Mines and Geology in Sophia, British Columbia University of Vancouver, Canada, while the existing collaboration relations with the Indian Institute of Technology in Kharagpur, India, and all the technical universities in Europe (Poland, Czech Republic, Turkey, Italy, Germany, and France) continued.

Meetings of the representatives of the university of Petrosani were held at the *Academy of Natural Sciences* in Moscow, *Mines and Metallurgy Department*, at the *National University of Science and Technology* in Moscow, and the *National Mineral Resources University* in Sankt Petersburg, in August 2015, with a view to establish the collaboration in the research field with these universities and science academies.

The participation in the 26th Annual General Meeting and Conference Society of Mining Professors SOMP, June 21st – 26th, 2015, at TU Bergakademie Freiberg, and on the occasion of the celebration of 250 years of existence of TU Bergakademie Freiberg, November, 19th – 21st, 2015, represent events that make visible the University of Petrosani and provide stability in collaboration and tradition.

The University was also invited and took part, at the embassy of the United States of America at Bucharest, in the event *Business Lunch in Research*, in March 2015, which was a good occasion to find new research opportunities in the American space.

4. Observing the ethics of scientific research

An important issue that concerns the carrying out of scientific activity deals with research ethics. Scientific research implies a multi-fold responsibility: scientific, moral, social, political, etc. Scientific researchers undergoing researches are directly responsible for their discoveries. The central element of the ethics of scientific research is researchers' responsibility for their work, and, especially, for the results of their work. Scientific researchers should justify their research act, its usefulness and the validity of its result, while also bringing a benefit to society. Taking into account these aspects, all scientific researches should observe moral censure. Research activities are

activities of high professional prestige, which compulsorily require a work style or a behaviour model and imply the following aspects: (i) seriousness in choosing and studying the research theme; (ii) professional, moral, and social responsibility; (iii) respect for work, for the theme under research, and for the researcher; (iv) sincerity and modesty; (v) sincere and correct cooperation within the research group; (vi) respect for hierarchies, statutes and assignments within the research group; (vii) communication of the results after their previous and solid verification, observing scientific value and correctness.

Research ethics should also have in view the “moral misbehaviours” of scientific researchers. Among such misbehaviours that disregard the standards of scientific research ethics one should mention: • the theft of ideas • parallel researches that have as a goal the undermining of authentic research activities in order to depreciate them, to make them uninteresting and useless • communication of incorrect or theoretically false results or offering insignificant, useless and even dangerous results • the use of scientific research activity contrary to the interests and security of humankind, targeting malevolent, antisocial, and destructive objectives, etc.

No scientific research owning a rigorous scientific character may be undergone without observing certain leading principles or laws. These principles are necessary as they represent the standards all researchers have to consider in connection with their activity. They not only represent rules to be followed by researchers in their activity, but also are moral landmarks that require an ethical attitude from those who undergo researches both in connection with the object of their research and the results coming out of such scientific analyses.