

**EXTERNAL EVALUATION REPORT**

for

**POLITEHNICA UNIVERSITY OF TIMIȘOARA (UPT)**

**DOCTORAL FIELD**

**Engineering and Management**

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## **Contents**

- I. Introduction
- II. Methods used
- III. Analysis of performance indicators
- IV. SWOT Analysis and Recommendations
- V. Conclusions and general recommendations
- VI. References

### **I. Introduction**

This report summarizes the findings from the external evaluation of doctoral field of Engineering and Management at the Politechnica University of Timișoara (UPT). First, some background information is given as context, then the resources and methods used to prepare this report are listed. Next, an analysis of the performance indicators is given, followed by a SWOT analysis followed by the recommendations. Finally, conclusions are made.

#### **General Background:**

The Doctoral School of Engineering Studies at IOSUD-UPT was established in 2011. The main objective of the Doctoral School of Engineering Studies is the education of doctoral students for the qualification of independent scientific researcher and defending a doctoral thesis leading to Ph.D. degree. The doctoral program is composed of a training program that is based on advanced university studies (1 year) and an individual doctoral scientific research program (at least 2 years). The mission of the Doctoral School of Engineering Studies in IOSUD-UPT is to coordinate the doctoral studies in UPT using the same academic criteria and performance standards applied to all accredited doctoral fields in IOSUD-UPT. The Doctoral School provides related advanced courses offering the necessary knowledge for the doctoral studies and promotes the appropriate skills and ethics for scientific research, while stimulating the academic standards of performance and originality. At the level of the doctoral field, the main objective is the

development of doctoral studies that ensure a high success rate in obtaining the doctoral degree. To achieve this objective, UPT has several policies and procedures for monitoring, evaluation quality and continuous development as outlined in the Self-Assessment Report. The Doctoral School of Engineering Studies from IOSUD-UPT manages 13 fields of doctoral university studies with Engineering and Management being one of them. The Doctoral School of Engineering Studies has a team of 78 full-time Ph.D. supervisors and 53 associate Ph.D. supervisors (with fixed-term employment contracts).

### **The Doctoral field of Engineering and Management**

The doctoral program includes an advanced training aspect and a scientific research one. The Engineering and Management area of study provides the PhD students with an advanced education program training of a researcher able to conduct high level research in the context of scientific methods and to use research results in projects, publications and communications, all in accordance with the principles of academic integrity and ethics, and intellectual property rights. The curriculum is flexible, and it is periodically updated and in keeping up with the specific developments in the research area. The doctoral program of engineering and management at UPT has a number of quality assurance procedures and systems to ensure quality of the academic program in all aspects. These are detailed in the Internal Evaluation Report.

### **PhD Advisors/Coordinators:**

Within the field of Engineering and Management, there are seven IOSUD UPT affiliated Ph.D. supervisors/coordinators advising the doctoral students. Four of them are full time doctoral coordinators with an employment contract for an indefinite period (tenured). In the past five years, the PhD advisors have contributed to the publication of a significant number of high-impact papers. Through the research projects obtained in competitions, PhD advisors have contributed to the development of research centers that provide PhD students with the best conditions for the completion of original, internationally recognized PhD theses.

**Doctoral Students:** Doctoral students come from local industries and from international sources. Most of them are engineers or supervisors working full time. Some have their own companies. The number of doctoral students during the last five years (from 2015 to 2020) ranged from eight to thirteen, totaling 50 students. Within the same period, fifteen doctoral students successfully defended their theses and graduated with their PhD degrees in Engineering and Management. Doctoral students must publish at least two articles in indexed publications before they can defend their theses. This practice raises the standards and prepares the students for academic employment. The graduation rate seems to be 50%, which is in line with many Engineering and Management programs internationally.

**Research Directions:** Engineering and management (EM) involve integration of a mix of disciplines. This multidisciplinary nature enables the EM program to address the research and development needs of local and international companies. The doctoral program in EM at UPT attracts students from local industries and multinational companies. Doctoral theses address multiple research areas. These areas include, supply chain management and transportation research, as there are multiple distribution centers in the region, project management, safety, risk analysis, organizational management, energy systems and knowledge management. These research directions are common and appropriate for many national and international engineering and management programs. They cover a variety of multidisciplinary fields.

## **II. Methods Used**

This report is based on the information supplied by UPT Self-Assessment Report of the Doctoral Field of Engineering and Management and several Zoom meetings/discussions with program administrators, research centers, program coordinator, faculty advisors, doctoral students, doctoral graduates and their employers. On site visit was not possible due to the COVID virus pandemic (see References section for resources used).

## **III. Analysis of Performance Indicators**

### *Standards and Performance/Field Indicators*

Evaluation Criteria for doctoral programs at UPT are grouped under parts A, B and C and their multiple sections are listed in the self-study report. The following conclusions are based on

the Engineering and Management Doctoral Field's internal evaluation report of the field of engineering management and the meetings/discussions listed in References. The internal evaluation report was thorough and very well prepared. The information needed for the analysis was available in detail.

To avoid repetitions, only assessment results and sections thought to be significant are discussed (see the internal-evaluation report for details).

## **A. Institutional Capacity Indicators**

### **A.1. Management and administration institutional structures, and financial resources**

**A.1.1.** The Organizing Institution of the Doctoral Studies (IOSUD) implemented the mechanisms for an effective performance as provided in the specific legislation on the organization of doctoral studies.

*All criteria for performance sub indicators under A.1.1.1 were fulfilled*

*All criteria for performance sub indicators under A.1.1.2 were fulfilled*

**A.1.2.** A.1.2. IOSUD has the necessary logistical resources to fulfil the mission of doctoral studies.

*All criteria for performance sub indicators under A.1.2.1 were fulfilled*

*All criteria for performance sub indicators under A.1.2.2 were fulfilled*

**A.1.3.** IODS ensures that financial resources are used optimally, and revenues from doctoral studies are supplemented by additional funding in addition to that provided by the government funding

*All criteria for performance sub indicators under A.1.3.1 were fulfilled*

*All criteria for performance sub indicators under A.1.3.2 were fulfilled.*

*All criteria for performance sub indicators under A.1.3.3 were fulfilled*

At least 10% of the total amount of sums corresponding to the doctoral grants obtained by the university by means of institutional contracts and by means of tuition fees collected from self-funded doctoral students are used in order to fund the doctoral students' professional training expenses.

**A.2.1.** IODS has a modern research infrastructure that enables the implementation of specific doctoral studies activities.

*All criteria for performance sub indicators under A.2.1.1 were fulfilled*

**A.3.1.** Within each area of study there is qualified staff, with the necessary experience for the implementation of the PhD program.

*All criteria for performance sub indicators under A.3.1.1 were fulfilled*

*All criteria for performance sub indicators under A.3.1.2 were fulfilled*

At least 50% of the doctoral advisors in the evaluated doctoral area of study are tenured professors within the IOSUD-UPT. There are four tenured professors at UPT, therefore the percentage is 57.14%. This was marked as partially fulfilled but it seems that the requirement is met.

*All criteria for performance sub indicators under A.3.1.3 were fulfilled*

*All criteria for performance sub indicators under A.3.1.4 were fulfilled*

The percentage of doctoral advisors who concomitantly supervise more than 8 doctoral students, but no more than 12, during their doctoral studies is zero %, therefore does not exceed 20%.

**A.3.2.** The doctoral advisors in the area of study conduct internationally visible scientific activity.

*All criteria for performance sub indicators under A.3.2.1 were fulfilled*

*All criteria for performance sub indicators under A.3.2.2 were fulfilled.*

At least 50% of the doctoral advisors in the doctoral area of study are still active in their scientific field, obtaining at least 25% of the score requested by CNATDCU minimal standards in force at the time of the evaluation, that are required and compulsory in order to obtain the habilitation qualification, on the basis of scientific results within the past 5 years. In this case it was 100%.

## **B. EDUCATIONAL EFFICIENCY**

**B.1.1.** The institution that organizes the PhD program has the capacity of drawing applicants outside of the institution of higher education or in larger numbers than the budget funded places.

*All criteria for performance sub indicators under B.1.1.1 were fulfilled*

**B.1.2.** Accepted doctoral candidates demonstrate academic, research and professional merit.

*All criteria for performance sub indicators under B.1.2.1 were fulfilled*

An interview with the applicant is a compulsory part of the admission procedure.

*All criteria for performance sub indicators under B.1.2.2 were met*

**B.2.1.** The education program based on advanced higher education studies is adequate for the improvement of the PhD students' research skills and the strengthening of ethical behavior in science.

*All criteria for performance sub indicators under B.2.1.1 were fulfilled*

*All criteria for performance sub indicators under B.2.1.2 were fulfilled*

*All criteria for performance sub indicators under B.2.1.3 were fulfilled*

*All criteria for performance sub indicators under B.2.1.4 were fulfilled*

*All criteria for performance sub indicators under B.2.1.5 were fulfilled*

**B.3.1.** The research is used by the PhD students in participation to scientific conferences, scientific publications,

*All criteria for performance sub indicators under B.3.1.1 were fulfilled*

*All criteria for performance sub indicators under B.3.1.2 were fulfilled*

**B.3.2.** The Doctoral School enlists a significant number of external scientific reviewers for the PhD defense committees for the analyzed area.

*All criteria for Performance sub indicators under B.3.2.1 were fulfilled*

*All criteria for Performance sub indicators under B.3.2.2 were fulfilled*

## **C. QUALITY MANAGEMENT**

**C.1.1.** The institutional framework exist and policies and procedures are applied for the internal assurance of relevant quality.

*All criteria for performance sub indicators under C.1.1.1 were fulfilled*

*All criteria for performance sub indicators under C.1.1.2 were fulfilled*

**C.2.1.** Relevant information for PhD students, future candidates and other information of public interest, respectively, are available for consultation electronically.

*All criteria for performance sub indicators under C.2.1.1 were fulfilled*

**C.2.2.** IOSUD/The doctoral school provides PhD students with access to the resources necessary for the pursuit of doctoral studies

*All criteria for performance sub indicators under C.2.2.1 were fulfilled*

*All criteria for performance sub indicators under C.2.2.2 were fulfilled*

*All criteria for performance sub indicators under C.2.2.3 were fulfilled*

**C.3.1.** There is a strategy and it is applied to increase the internationalization of doctoral studies.

*All criteria for performance sub indicators under C.3.1.1 were fulfilled*

IOSUD, for the evaluated doctoral field, has mobility agreements with foreign universities, with research institutes, with companies that carry out activities in the doctoral field, related to the mobility of doctoral students and teachers (for example, ERASMUS agreements for the Doctoral studies cycle). At least 35% of doctoral students. IOSUD develops and implements policies and action plans aimed at increasing the number of doctoral students participating in training courses abroad, up to at least 20%, which is the target at the level of the European Higher Education Area.

*All criteria for performance sub indicators under C.3.1.2 were fulfilled*

*All criteria for performance sub indicators under C.3.1.3 were fulfilled.*

**Conclusion for A, B, and C:** *All criteria for performance indicators A, B, and C are fulfilled in all areas.*

Overall, a review and analysis of all criteria for Standards and Performance/Field Indicators at the level of Engineering Management Doctoral Field were met. This is a major accomplishment.

#### **IV. SWOT Analysis and Recommendations**

The doctoral program of Engineering and Management at UPT has many strengths and opportunities. Some of the *strengths are:*

The doctoral program appears well structured and managed with able students and coordinators dedicated to students' well-being and success. The program has been, and continues to be,



successful as evidenced by the enrollments, graduates and theses defended over the past five years.

The doctoral program in EM at UPT addresses the needs of the industry and attracts students from these local and international companies. Doctoral theses address multiple research areas. These thesis topics include, supply chain management and transportation research, as there are multiple distribution centers in the region, project management, safety, risk analysis, organizational management, energy and knowledge management. The multidisciplinary nature of the EM program and how it addresses the research and development needs of local and international companies is a strength.

All current doctoral students, graduates and employers unanimously cited the program's doctoral coordinators as a major strength. Coordinators are very helpful, willing to meet any time, always available, organized and provide positive guidance on thesis research, writing papers and publishing. Students appreciated the mentoring and the one to one relationship they got.

Former students were very also very complementary of the doctoral program in Engineering and Management at UPT. The curriculum is flexible, and it is updated and in keeping up with the specific developments in the research area and industry needs. Some students commented on the program as an "extraordinary experience" that "changed their trajectory at a professional level" and gave them the courage to start their own companies. These employers who are former students, approach the EM faculty/coordinators and PhD students in areas of expertise needed and hire the program's graduates. This is indeed a reflection of the quality of the program and their PhD studies. Clearly, the UPT doctoral program in Engineering and Management positions students to be able to find employment and/or advance in their current engineering and middle management careers in local and international industry and academia, a major strength.

Another strength is the program's successful cooperation with industry and its contributions for their success. Such effort has led to establishment of industry/university partnerships leading to solutions to many issues faced, resulting in financial and research support for the doctoral students. Such companies support the students financially, paying for half of the costs for the program. Companies come to campus to recruit EM doctoral graduates to work in their research,

indicating success due to the multidisciplinary nature of the program providing a great advantage.

The research at UPT resulted in many published books and scholarly articles in reputable journals. A sign of the program's success and strength. There appears ample support from the university for doctoral students. Students mentioned that they are always provided with funding and support they need for publishing papers, attending conferences, and accessing data bases and for industry cooperation. Several internal and external scholarships are available for the students. UPT has several research centers and laboratories that enable the students and the coordinators to cooperate in thesis research. The doctoral program has been actively seeking international co-operation in research, education, and student exchange. These activities can attract new students and new research ideas and cooperation.

One can make some recommendations in terms of *opportunities* for improvement that may be seen as *weaknesses*:

All doctoral students mentioned that the advance training in ethics subject should be earlier in the program during the first year, where it is most needed. Preferably, this training should be during the first semester, getting it later may not be helpful. Students also mentioned that a training course in writing would be helpful during the first year as at least two indexed publications is a requirement for defending their theses later.

A student mentioned that there is financial support for attending conferences and publishing, but reimbursement expenses has been slow in some cases. This seems to be a common issue in most universities that could be difficult to address as it is related to the system not specific to any program. Students mentioned that scholarships are very helpful and available but their duration in some cases seems to be limited to three years. It may be difficult to complete the program in three years as it takes time to publish at least two articles so that they can defend their theses. Increasing funding and its duration by seeking additional sources of funds other than governmental/university ones may be helpful. An opportunity here may be to offer certificate programs to the industry with short courses for profit. The proceedings from such efforts can increase both the availability of student funds and industrial cooperation.

One first year student, new in the program, mentioned difficulty in accessing data bases and resources and having difficulty in reaching to other doctoral students to discuss ideas, writing papers and help in thesis work. Several others, most of which were later in their program did not have the same issues. Perhaps a forum where first year students have easier access to each other and to more senior students may be helpful, enabling direct communication with other students.

## **V. Conclusions and general recommendations**

Internationally, Engineering and Management programs at graduate level are both popular and serve an essential need from industry, academia, and applied research. The popularity seems to stem from the multidisciplinary nature of the curricula and research and cooperation with the industry. Students, practicing engineering professionals and administrators of technical organizations with diverse backgrounds are attracted to the field of Engineering and Management as they all find themselves operating in a project management environment.

Overall, the Doctoral Field in Engineering and Management at UPT has clear and well-defined objectives and well thought out curricula, fulfilling a unique need for a multidisciplinary doctoral program addressing industry demands and meeting student expectations. The program produces quality theses, attracting international students. The doctoral program has been fulfilling all quality assurance measures in meeting standards imposed (see section III). The doctoral theses and student research are leading to scholarly publications, research proposals and industry partnerships.

The doctoral program has also been seeking International cooperation and experience and an entrepreneurial dimension in research and education. The program seems to be a major inspiration that enables creation of new small businesses and start-ups by its graduates.

Some students may like to see more provisions in enabling collaborations with other students in exchanging ideas and experiences. Perhaps a research forum, held once or twice a year to enable collaborations with masters and doctoral students and other domains in exchanging ideas and experiences may be very helpful where each doctoral student presents an outline of their research/methodology to all other doctoral students and the faculty of the department. We do this

annually and invite industry and government representatives also. It is also a good recruiting tool to increase PhD enrollments.

Overall, the doctoral program of Engineering and Management at UPT is a successful program growing rapidly, with many opportunities. Indications show that the doctoral field in Engineering and Management is well managed by its faculty and administrators, with dedicated advisors going out of their way in advising students in challenging research areas. Current doctoral students, graduates and employers are very complementary of the doctoral program. It seems to be an ideal environment where students and their advisors are working in harmony to make the program a continued success. The program also contributes significantly to the industry's development and success.

## **VI. References and resources:**

-IOSUD\_Polytechnica University Timișoara, Self-Assessment Report (2021).

-27.9.2021 ZOOM meeting: 14:00 pm. Internal Team Meeting/EM, UPT.

-27.9.2021 ZOOM meeting: 15:00 pm. Academic Staff, UPT.

-30.9.2021 ZOOM meeting: 15:00 pm. Doctoral Students, UPT.

-30.9.2021 ZOOM meeting: 16:00 pm. Research Centers, UPT.

-30.9.2021 ZOOM meeting: 17:00 pm. Doctoral Graduates, UPT.

-30.9.2021 ZOOM meeting: 18:00 pm. Employers, UPT.