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HELLENIC REPUBLIC
H.Q.A.
HELLENIC QUALITY ASSURANCE AGENCY
FOR HIGHER EDUCATION

EXTERNAL EVALUATION REPORT

DEPARTMENT OF PRODUCTION MANAGEMENT ENGINEERING

DEMOCRITUS UNIVERSITY OF THRACE

According to Version 2.0 of the Template

December 2013

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External Evaluation Committee

The Committee responsible for the External Evaluation of the **Department of Production Management Engineering of the Polytechnic School of the Democritus University of Thrace,** consisted of the following five (5) expert evaluators drawn from the Registry constituted by the HQA in accordance with Law 3374/2005:

1. ***Prof. Andreas Alexandrou***
   University of Cyprus, Nicosia, Cyprus

2. ***Prof. Anthimos Georgiadis***
   Leuphana University Luneburg, Luneburg, Germany

3. ***Prof. Paul Maropoulos (Coordinator)***
   University of Bath, Bath, United Kingdom

4. ***Prof. Nicholas M. Patrikalakis***
   Massachusetts Institute of Technology, Cambridge, Massachusetts, U.S.A.

5. ***Prof. Constantinos Soutis***
   University of Manchester, Manchester, United Kingdom

Introduction

I. The External Evaluation Procedure

- **Dates and brief account of the site visit.**
- **Whom did the Committee meet ?**
- **List of Reports, documents, other data examined by the Committee.**
- **Groups of teaching and administrative staff and students interviewed**
- **Facilities visited by the External Evaluation Committee.**

HQA made available to the External Evaluation Committee (the *Committee*) information about the Department of Production Management Engineering (*DPME,* the *Department*) for early preparation of the evaluation. The provided Internal Evaluation Report of the Department covered the period 2004-2008, and was dated 2009. An update of the Internal Evaluation Report covering the period 2008-2011 was provided, dated 2012. The internal evaluation report presented useful information that formed the basis of the factual evidence for the Committee.

The Committee visited DPME of the Democritus University of Thrace (DUTH) from Monday 02/12/2013 to Wednesday 04/12/2013. Upon arrival at Xanthi, on Monday 2nd December, the Committee members were met by DPME faculty members.

The Committee met with the Department Chair, Prof. Stefanos Spartalis, the Vice-Rector for Investments and Infrastructure Planning, Associate Prof. Pantelis Botsaris, who is also a member of faculty in the Department, and the members of the Internal Evaluation Group (OMEA), Prof. Prodromos Hatzoglou (Chairman), Prof. Charalambos Arapatsakos and Associate Prof. Antonios Gasteratos. The meeting took place at the hotel. During the meeting the Committee briefly discussed with the Department Chair the visit details and schedule. Later the same night, the Department hosted a dinner for the Committee, making the first exchange of information possible. The dinner was attended by the Department Chair and members of staff that included Profs. Botsaris, Hatzoglou, Arapatsakos and Gasteratos.

On Tuesday, 03/12/2013, the Committee was informed by Prof. Spartalis that the Student Union had occupied the Polytechnic School for 3rd and 4th December 2013, as a protest related to the external evaluation of DPME by the Committee. As a result of the occupation the schedule was changed and it was decided that the work of the Committee would take place at the hotel. Therefore all meetings such as those with the staff, the undergraduate (UG) and postgraduate (PG) were held at the hotel. The Department in its presentation used a selection of visual aids (photos and videos) to give the Committee an impression of the DPME infrastructure and laboratory facilities. Overall, this process worked well and the Committee believes that the fact that site visits were not possible had not impacted negatively in its work, although prevented its members to comment on infrastructure. On 4th December 2013, the Committee was able to visit one of the Departmental Laboratories that is located at the University Campus.

The first meeting on 3rd December was with the DUTH Vice-Rector, Prof. George Costa. The Vice-Rector gave an overview of DUTH, its Departments, its general direction and current problems/issues the DUTH Administration faces. Following this meeting, the formal part of the programme started and the Committee was introduced to the Department by Prof. Spartalis, the Department Chair. This meeting was attended by members of the Internal Evaluation Group (OMEA) and other faculty members.

Prof. Spartalis outlined the structure of the University, School and Department. The Department was created in 2000 and from 2005 became self-governed, with its own General Assembly and graduated its first students in 2005. There are three (3) Divisions within the Department but these have not been formally declared operational as the number of staff per Division is below the critical number required. The planned Divisions are; (i) Production Systems, (ii) Management Systems, (iii) Materials, Processes and Mechanical Engineering. The Department has 13 Laboratories, out of which 9 are operational.

The Department offers a wide range of courses (67) and the award of the Degree requires the successful completion of 54 courses – 6 courses per semester over 9 semesters - of which 46 are compulsory and 8 optional. In general terms, the courses are clustered into four (4) areas; "Basic/Foundation", "Industrial Production", "Management" and "Mechanical Engineering". Lectures and support material for these courses are offered on-line in the DUTH "eClass" system, with approximately 85% of courses being available electronically. Each compulsory course includes 5 hours of learning activities per week - 3 hours for lectures and 2 hours for laboratories and tutorials – over the 13 weeks of each semester. Optional courses include 3 hour per week learning activities.

DPME is a relatively small Department consisting of; 13 faculty members - 5 Professors (1 on a 3-year unpaid leave), 3 Associate Professors and 5 Assistant Professors – 2 technical staff members (currently 1 in service), and 4 administrators. The Department has 745 undergraduate students and 56 PhD students, which results in a high student/staff ratio in comparison to similar institutions at national and international level. In the period from 2000-2013 there have been 483 diploma graduations and 23 candidates were awarded the degree of PhD. According to Prof. Spartalis upon graduation 50% of DPME graduates go to industry, 25% go to Universities for further studies or employment and 25% are self-employed.

The resource profile of DPME was presented and was reported that from 2008-2013 the University allocated 120,000 € equipment budget and 295,500 € operating budget to DPME. The Committee noted the drastic reduction of the operating budget since 2010 that reached its lowest level in 2012 and slightly improved for 2013 and 2014.

The research of the Department was presented and a key highlight is the publication by faculty members of 432 papers in learned journals, since 2000. During the period 2009-2013 DPME faculty has published 220 journal papers, with an average of 16.9 journal papers per faculty member. The analysis of DPME research is given in Section C, below.

The Committee had the opportunity to meet with representatives of UG and PG students from the Department. It is important to note that despite the Student Union occupation of the Polytechnic Scool, the students of DPME had decided to participate and fully support the external evaluation process and a large number of them (more than 40) came to the hotel and met with the Committee . In this meeting the students provided very detailed, open and valuable feedback to the Committee and contributed greatly to its work; their enthusiasm and honesty impressed its members. The specific points will be covered in the following sections of this report.

Associate Prof. Antonios Gasteratos then outlined, on behalf of the OMEA, the Internal Evaluation process, especially focusing on course evaluation using questionnaires. The process for the completion of questionnaires was outlined. The questionnaires are based on the HQA template. Additional fields were included in order to cover specific issues such as

self-satisfaction and hours of study per course. The questionnaire completion rate ranges from 25% to 30%. OMEA's role includes the calculation of results from questionnaires and the communication of these to faculty members.

The schedule of meetings on 3rd December 2013 was concluded with a presentation by Prof. Botsaris, covering his research field and giving an outline of his Laboratory's structure and composition. He also outlined a University initiative to promote industry and University cooperation. In the Committee's opinion this was an important and timely initiative.

The Committee's programme on 4th December started with a meeting with the Associate Secretary of the Department, Mrs Sophia Gazzie and 3 members of the administration team. The meeting was also attended by Mr G. Haitidis, who is the Department's only technical support member of staff (the other technical staff is on an unauthorised leave). The key issues arising from this meeting will be analysed in Section D.

Then the Committee met in private with each member of faculty and discussed the operation of the Department and their individual research priorities. The discussions that took place were very open and constructive and provided valuable additional perspectives.

The next meeting was with graduates of the program and PG students (PhD candidates) who work in industry or are self-employed. These sessions were fully attended, cordial, candid, informative and lively. The PhD students outlined their research activities and noted that in their view the Department had the infrastructure required for their research. The graduates from the Department informed the Committee that their studies in the Department had prepared them well for their current roles in industry. They also stated their full support for the Departmental plans to secure funding for a special programme that will be placing undergraduate students in industry during the summer months and of linking further the diploma studies in the Department with industrial needs and requirements.

The final activity on 4th December was the visit of the Laboratory of Thermodynamics and Heat Engines that is based at the University Campus. During the visit, undergraduate students and graduate students gave detailed and enthusiastic descriptions of their research activities. The Committee is thankful to the Department as well as to the staff and the students involved in organising this visit, as this was the only visit to Departmental facilities due to the occupation.

Before departing for the Airport, the Committee met with the Department Chair for an initial debriefing.

Overall, the external evaluation visit took place in a highly professional but equally cordial and collegial atmosphere. The Committee members are unanimous in wishing to express in writing their gratitude and appreciation to all the faculty, staff and students of the Department for their excellent hospitality, collaboration and help with all aspects of the evaluation visit, without which this evaluation would not have been possible. The Committee is also tankful to HQA for the logistical support and co-ordination.

II. The Internal Evaluation Procedure

- **Appropriateness of sources and documentation used**
- **Quality and completeness of evidence reviewed and provided**
- **To what extent have the objectives of the internal evaluation process been met by the Department?**

The Committee was provided with adequate documentation on all relevant aspects of the

Department's operations. In addition, the Committee was presented with a copy of the most recent Department's Internal Evaluation Report that was thorough, detailed, comprehensive, and informative.

The internal committee (OMEA) responsible for preparing the Internal Evaluation Report had performed a good job in collecting the available data, organizing it in very useful forms for the Committee and summarily presenting it.

A. Curriculum

Undergraduate curriculum

APPROACH and IMPLEMENTATION

- **What are the goals and objectives of the Curriculum? What is the plan for achieving them?**
- **How were the objectives decided? Which factors were taken into account? Were they set against appropriate standards? Did the unit consult other stakeholders?**
- **Is the curriculum consistent with the objectives of the Curriculum and the requirements of the society?**
- **How was the curriculum decided? Were all constituents of the Department, including students and other stakeholders, consulted?**
- **Has the unit set a procedure for the revision of the curriculum?**
- **How effectively is the Department's goal implemented by the curriculum?**
- **How does the curriculum compare with appropriate, universally accepted standards for the specific area of study?**
- **Is the structure of the curriculum rational and clearly articulated?**
- **Is the curriculum coherent and functional?**
- **Is the material for each course appropriate and the time offered sufficient?**
- **Does the Department have the necessary resources and appropriately qualified and trained staff to implement the curriculum?**

This is a relatively new, multi-disciplinary study programme (started in 2000) supported by a range of research laboratories. The programme aims at teaching students about problems and challenges faced by manufacturing companies, engineering consultants and the service sector in relation, among others, to the utilisation and management of mechanical engineering systems, robots and automation; it is expected that DPME students will become the professional Engineers able to assist them in this matter. The Internal Evaluation Report provided by the Department and the visit, showed that goals and objectives of the Curriculum need to be better defined in order to assist students, especially at earlier years, and other stakeholders of the Department to better understand them.

The objectives and structure of the curriculum follows that of similar programmes in the

country. However, it wasn't clear from the documents and discussions during the visit of any wider consultation with other stakeholders (students, industry or professional bodies at local or national level).

It is expected that the curriculum will enable students to learn how to manage the development, analysis and service tasks independently. As graduates of a cross-disciplinary programme, they will also gain a special competence sought after by many employers (especially small and medium size enterprises (SMEs), that dominate in the region and country in general), and the ability to bridge gaps and co-operate with people from many different academic as well as professional fields. Although the curriculum offers 67 modules covering many aspects of engineering, production and management, providing much choice to the student, the current number of 11.5 faculty members of staff, supported by 1 technical officer, appears relatively small to deliver and adequately support the programme, maintaining the standards expected of tertiary education.

It is important for the Department to continuously update and renew the curriculum taking into account recent developments in the field and considering the views of students and industrial partners and this is an area they need to further strengthen. For instance, electromagnetism, chemistry and materials related to manufacturing (currently missing from the curriculum) could be included in the syllabus of existing courses. Satisfactory procedures do exist for revising the curriculum although this is not entirely clear from the Department's Internal Evaluation Report. A teaching unit chaired by a senior academic and consisting of members from the various teaching themes, including student representatives, that regularly meet could make the process more efficient, reliable and accountable.

IMPLEMENTATION

Staff shortage, as identified by the Department's leadership and mentioned earlier in this report, creates certain problems with the delivery of such a multi-disciplinary programme with an extensive number of modules, 67 in total (54 required for awarding the Diploma). Some issues associated with the name and identity of the Department remain that in some respects cause confusion to staff and students, which may have an effect on curriculum implementation and quality, in addition to recognition by other stakeholders.

From the data provided and the available information it appears that the curriculum followed is comparable to that of equivalent institutions with a similar student intake. The structure of the curriculum is satisfactory; however timely revisions and clarifications would help the students and other stakeholders to better understand the aims and objectives of this cross-disciplinary programme. Overall, the curriculum structure appears coherent and functional, although the shortage of academic and technical staff, overloads and overstretches the current colleagues, which then may have an effect on curriculum delivery, student support and experience in addition to impacting the volume and quality of research output.

The syllabus and structure of each course/module available should be more detailed for the students' benefit and for maintaining academic standards. Creating a Teaching Committee

and appointing Year Tutors, under the guidance of a Director of Studies or Senior Academic Tutor could assist in this respect. Moreover, an external academic examiner from an equivalent academic institution could ensure maintaining consistency and standards.

The existing staff (11.5 academics with 1 technical support member of staff for an annual intake of 150 students) is appropriately qualified and well trained and the Committee felt that there was a very good level of commitment from the Department's staff to contribute towards the improvement of all aspects of the Department's teaching and learning activities and achieve the successful delivery of the curriculum.

RESULTS

- **How well is the implementation achieving the Department's predefined goals and objectives?**
- **If not, why is it so? How is this problem dealt with?**
- **Does the Department understand why and how it achieved or failed to achieve these results?**

Predefined goals and objectives are achievable, although new staff appointments at academic, technical and administration levels (as described in the Department's Internal Evaluation Report) and identified by this Committee, would improve dramatically the student experience, learning and training. This will also result in a better working environment for all.

Investment in new appointments (appropriate for the defined student intake) and better use of available resources can lead to improvements of the curriculum and the delivery of such a cross-disciplinary programme.

Many of the issues raised in this report have been identified by the Department's leadership and staff. Despite the difficulties related to funding and staff shortages, serious efforts are being made by faculty members, technical and administration staff to deliver the curriculum in a satisfactory manner, without affecting student experience.

IMPROVEMENT

- **Does the Department know how the Curriculum should be improved?**
- **Which improvements does the Department plan to introduce?**

Faculty staff and Departmental leadership are aware of issues related to curriculum and student experience and an effort is being made to account for quality related changes introduced currently in Higher Education, and implemented in the programme.

In addition to the Department's suggestions for new appointments and curriculum improvements outlined in the Department's Internal Evaluation Report, the following recommendations should be considered by the Department that will enable better curriculum delivery, enhanced student and staff satisfaction and an improved and more productive working environment.

Academic Level - Introduction of the following roles and committees

Roles: (i) Director of Studies who will be responsible for the management of the delivery of the undergraduate Programme of Studies; (ii) Year Academic Year Tutors, who will oversee all teaching and learning activities within each year of study and be the first points of contact for the students; (iii) Personal Tutors/Mentors, who will be the named faculty member who will provide mentoring support and advice to each student throughout the studies, in a flexible manner as may be required; (iv) External Examiners who will be academic experts from other Universities, appointed to advise on each one of the three teaching themes offered by the Degree Programme of Studies, in order to ensure that comparable standards exist and maintained between the Department and other Universities.

Committees: (i) Teaching Committee, which will be chaired by the Director of Studies and will comprise the Academic Year Tutors and additional faculty members, with its aim being the structuring and overseeing of the teaching and learning process; (ii) Student & Staff Committee, which will comprise members of the Teaching Committee and student representatives from each year of study and its aim will be to improve the collaboration and coordination between faculty members and students in order to promote best practice and account for the students' needs and requirements; (iii) Departmental Advisory Board, with members drawn from industry, local community (council and region) and professional bodies, invited expert academics from other Universities and alumni. The Board will invite faculty, staff and student representatives to attend its meetings.

Administration & Support Level:

Some of the following suggested administration and technical staff could be provided at Polytechnic School level that the Department would benefit:

Undergraduate Student Experience Officer to manage the induction process and materials for new undergraduate students and ERASMUS students; *Postgraduate Student Experience Officer*; *Information Technology Administrator* to manage all IT procurement needs, provide technical guidance to staff and students, provide technical support for IT systems and software, undertake IT training support for staff as required and manage internal communications IT development and support; *Programming Support Officer* who will assist the IT administrator to provide support for teaching technologies procurement and implementation, manage data back up and provide support for web developments; *Experimental Officer* to assist with teaching laboratories with *Technicians* covering needs of the teaching themes and ensuring the implementation of Health and Safety guidelines.

Additional specific recommendations are listed below:

Recommendation A1*: An explicit document showing how the curricular objectives are 'translated' into competency-based learning goals, and those in turn clustered into courses serving a meaningful whole is missing and is advisable.* The Department's Internal Evaluation Report does not indicate the existence of an annually updated **Study Guide** that provides such information for all years.

Recommendation A2: *The Committee recommends the strengthening of the Departmental identity as a Department of Production & Management Engineering, driven directly from its mission statement.* This will benefit students, staff and other stakeholders.

Recommendation A3: *The number of courses listed in the Department's evaluation report, currently 67, may be comparable to those offered in equivalent five-year programs in Greece, it is however larger than in the average universally accepted curricula (especially for a Department with 11.5 academic staff) and the Committee feels that this needs to be reduced for improving delivery and depth. The syllabus of the courses needs to be updated regularly.*

Recommendation A4: *As said earlier, it is suggested to consolidate and better integrate the existing courses of the 1st cycle (undergraduate curriculum) towards the mission statement to "prepare, through teaching and research Production & Management Engineers with skills necessary for the dynamic design of production systems and management skills, while in parallel cultivating the ability to follow the developments in their scientific theme'.*

Postgraduate curriculum

The department does not offer a postgraduate programme. A proposal is in existence but the Committee would like to stress that launching such a programme will further increase the teaching load of staff, at a moment that there is staff shortage.

There are no special remarks for the doctoral programs that appear to be delivering appropriate content in the respective areas of specialisation.

B.1 Teaching—Undergraduate level

APPROACH

Does the Department have a defined pedagogic policy with regard to teaching approach and methodology?

- **Teaching methods used**
- **Teaching staff/ student ratio**
- **Teacher/student collaboration**
- **Adequacy of means and resources**
- **Use of information technologies**
- **Examination system**

IMPLEMENTATION

- **Quality of teaching procedures**
- **Quality and adequacy of teaching materials and resources.**
- **Quality of course material. Is it brought up to date?**
- **Linking of research with teaching**
- **Mobility of academic staff and students**
- **Evaluation by the students of (a) the teaching and (b) the course content and study material/resources**

The Department is structured and operates like most Engineering Departments in Greece. It follows a five-year curriculum. Successful students are given a Diploma in Production and Management Engineering. The Department does not seem to have a distinctive educational approach. The number of faculty and current and historic number of students are given in the introduction, which are taken from the Department Chair's description on the status of

the Department. It is obvious that the student-to-faculty ratio of 57 based on the official numbers is very high for an effective educational system. It is noted that because one faculty member is on a three-year leave of absence and another has a 50% appointment the actual student to faculty ratio is about 65. The Department is asked to consider setting group Final Year Projects. This will result in lower teaching load but more importantly the faculty can assign demanding and multidisciplinary projects that characterize the nature of the program.

The Department faces significant space and financial resource constraints in order to make the 13 registered laboratories fully operational. It is most likely that the means and resources available may not be adequate to make all laboratories fully operational to support the teaching and learning process and hence cover all educational needs of the program, at least in the short term; however with careful reorganization within the Polytechnic School and by sharing of resources between Departments, many of these issues can be resolved. The student to faculty collaboration is good, a fact reinforced by the students during the interview with them. However, the Department does not use the concept of "Personal Tutor/Mentor" in order to provide individualized and flexible help to students.

The faculty use traditional in-class teaching combined with coursework and project based learning. Some courses are experimental, or use experiments to reinforce the material. Faculty and students make use of various technology platforms to enhance the educational process and these include but are not limited to PowerPoint and video presentations. Noteworthy is the e-Class platform where lecture material and notes are made available on the Internet. The policy of the Department to make available lecture material from past semesters, which may have been created by other faculty members, seems to create some confusion to students. It is important to ensure that for all courses offered by the Department, the e-Class system contains the up-to-date lectures and support material, as used for the current academic year. Additionally, the students reported that some course descriptions are not clear or detailed. This was brought to the attention of the faculty and they were urged to look into these matters.

The undergraduate students brought to the Committee's attention problems associated with course scheduling and classroom availability. They reported delays as long as thirty minutes in order to enter their assigned classroom or to start their lectures. The faculty members confirmed this situation but partly disputed the time delays.

A major issue, which unfortunately is observed in other Greek Universities, is the low undergraduate student attendance of lectures. Estimates provided by the students and faculty point to an average attendance figure around 30%. Efforts should be made to increase attendance by ensuring that lectures have better structure, and are more relevant to the professional needs of the students. It is important for the students to understand the connection between the courses that eventually will lead to their Diploma degree. Additionally, the way the course evaluation and examination system is structured should be improved. Specifically, the Department uses a combination of in-class written examination, project and coursework evaluation and the occasional oral examination. According to the

students, around 70% to 80% of the undergraduate courses use a single evaluation method for arriving at the final course mark. The Committee would like to alert the faculty about this issue. Mid-term testing (□□□□□□s) is not only a good way to improve the testing process but also to improve lectures attendance and learning. Additionally, the Department needs to develop a more formalized, and to the extent possible, uniform procedures for conducting written and oral exams.

The faculty staff and the students confirmed that a large number of doctoral candidates are involved in the teaching, a fact that in some cases is appreciated by the students but in other cases produces not satisfactory results. The Committee believes that the Department should establish clear guidelines and doctoral student training for the delivery of exercises and laboratories in order to improve teaching effectiveness and assist such doctoral students in their career objectives.

RESULTS

- **Efficacy of teaching.**
- **Discrepancies in the success/failure percentage between courses and how they are justified.**
- **Differences between students in (a) the time to graduation, and (b) final degree grades.**
- **Whether the Department understands the reasons of such positive or negative results?**

The Committee identified a genuine effort by faculty staff for the constant improvement of the educational processes. Their efforts are hampered by external factors some of which are mentioned elsewhere in the report.

There is good evidence that faculty are involving undergraduate students in their research through their Diploma Thesis. Occasionally, according to faculty members such efforts result in peer reviewed publications and conference proceedings. This practice of linking Diploma theses to research is applauded by the Committee. Faculty staff and students are aware of the possibility of academic exchanges and such exchanges are encouraged.

In the last two years, the Department introduced student evaluations of the undergraduate courses and the questionnaire processing is managed in its logistics by the OMEA members of the Department. The core issue is that the students were not aware of exactly how these results are assessed and employed for the continuous improvement of courses. The Committee considers that students should be better informed of how improvements are implemented.

IMPROVEMENT

- **Does the Department propose methods and ways for improvement?**
- **What initiatives does it take in this direction?**

The Department is set up to provide quality education in the best possible way with the available resources. Some of the suggestions made earlier will assist to enhance student learning.

The systematic course evaluation has been in operation for the past two academic years and

should be strengthened and continued.

Recommendation B1.1:
The Department must make efforts to improve student class attendance and participation. This can be achieved by changing the student advising process but more importantly by changing the testing and course examination system. A continuous assessment procedure can be an effective method to enforce not only participation in lectures but also improve the quality of the educational and examination process.

Recommendation B1.2:
The communication with the students can be improved by a number of different ways including; (i) introducing an annual briefing series of lectures given at the start of the year for the whole class in which the Department Chair and/or OMEA can introduce the courses for the new year, communicate lessons learnt from the feedback given by the students, and summarise course improvements and changes, and (ii) introducing Year Tutors and Personal Tutors/Mentors, as outlined in Section A.

B.2 Teaching—Postgraduate and doctoral levels

Postgraduate studies have not started at DPME as yet.

Doctoral program

The doctoral program follows also the Greek legal framework. The Department imposes a maximum duration of the program (six years) that the Committee considers a good practice.

C. Research

APPROACH

- **What is the Department's policy and main objective in research?**
- **Has the Department set internal standards for assessing research?**

The research activities carried out within the Department relate to the individual activities of its faculty members at multiple levels and in very diverse areas. Summarising these activities and taking into account the short life of the Department, the Committee considers that its research is at a satisfactory level. Since the creation of the Department, there have been eleven (11) competitively funded international projects involving collaborations with European partners, competitively funded national projects, and two (2) industrial contracts provided by the domestic public and private sectors. Doctoral candidates and, sometimes, undergraduate students (mainly through diploma projects) are involved in the research projects, something that the Committee considers as good practice.

The Department's policy for research improvement is expressed into six objectives. The objective to recruit new faculty members is the first priority of the Department. The other objectives concern the improvement of the Department's collaborations, dissemination, networking, infrastructure, quality of teaching and the establishment of postgraduate

studies. Furthermore, a group of faculty members have applied for creating an Institute "for production and innovation management and entrepreneurship", which has been approved by the University and has been submitted to the Government bodies for final approval. At this moment, nine out of the thirteen declared laboratories are in operation for research and teaching activities. Considering the research point of view, around half of the laboratories are performing in a satisfactory manner, but there is no evidence of coordination with each other and with other laboratories within the University.

Recommendation C1:

The Committee recommends that the Department should formally define its research strategy to provide clarity to its members in terms of its research direction and priorities. The Department could introduce means and measures to explore appropriated strategies using also external experts.

According to the information provided to the Committee, the Department does not appear to have a formal policy or standards in terms of the evaluation of internally conducted research. However, it can be argued that the Departmental policy in terms of research evaluation can be directly inferred from the Departmental practice and requirements in terms of publishing papers in international learned Journals and other peer-reviewed Conferences and Symposia. Indeed, the Internal Evaluation Report includes evidence that some research laboratories are internationally recognized due to their research activities, publications and awards. Further, from the CVs of the faculty staff there is evidence that some faculty members are well respected internationally by their peers. There is an assessment of research output and results built into the process of tenure and promotion of individual faculty members. The Committee noted that there is a clear emphasis on publications in SCOPUS and ISI listed Journals as the bibliographical information used by the Department is based on SCOPUS.

Recommendation C2:

The Committee recommends the establishment of an Annual Activity Report of the Department and the creation of internal research evaluation benchmarks and the identification and dissemination of best practice. Ideally, this should include the peer review of research processes and outputs in order to establish a shared understanding of research impact and quality.

IMPLEMENTATION

- **How does the Department promote and support research?**
- **Quality and adequacy of research infrastructure and support.**
- **Scientific publications.**
- **Research projects.**
- **Research collaborations.**

In the opinion of the Committee, the Department promotes research primarily via the following mechanisms:

(i) The generation and operation of the Research Laboratories, 9 of which are

operating or are being created at present.

(ii) The creation of an inclusive research ethos within the Department that involves faculty, doctoral candidates and undergraduate students.

(iii) Cooperative research within the frame of European and National projects.

The Committee notes a significant lack of dedicated staff for research support in almost all operating laboratories. In some cases, a laboratory cannot operate because of lack of suitably qualified personnel.

Recommendation C3:

The recommendation of the Committee is that the Department would need to find solutions for the recruitment of laboratory support staff.

From the information provided by the Department and the feedback of the doctoral candidates, the Committee considers that, in general terms, the research equipment is variable across the various research laboratories and it fulfils the needs of the on-going research mainly in the frame of the on-going PhD theses. There is no evidence of a single laboratory, which has reached a critical mass point that allows it to generate independently funded research.

Recommendation C4:

The recommendation of the Committee is that the Department would need to improve the equipment levels in a number of the existing research laboratories focusing the effort in order to reach the state of the art level and gradually to ensure that all other laboratories will be equipped at the same level.

The Department is active in terms of publications with more than two Journal papers and more than three refereed Conference papers per member of faculty, per annum. These are encouraging publication figures, notwithstanding that they include papers with multiple faculty members as authors. The Department also produced two patents and two awards in the reporting period.

Thirteen R&D projects have been performed or are active in the Department during the period (2004 -2013). The average budget of 250 k€ is low for the size of the department but acceptable because of the constitutional phase of it. Three projects are funded from FP6, two from FP7, one from ESA, two from industry and five from national funds, which are spread in different topics. The competitive EU projects belong mainly to the area of robotics. There is no evidence of planning the applications in terms of establishing a more stable acquisition of R&D income and ensure international visibility in selected fields. Very few members of the faculty are aware of the on-going Horizon 2020 activities.

In terms of research collaborations, the Department appears to have a number of active collaborations with Universities inside and outside Greece. Only two direct links with industry are mentioned.

Recommendation C5:

The Committee notes that the level of collaboration with industry is not as well developed and recommends that this is an area that requires further effort and attention from the Department.

RESULTS

- **How successfully were the Department's research objectives implemented?**
- **Scientific publications.**
- **Research projects.**
- **Research collaborations.**
- **Efficacy of research work. Applied results. Patents etc.**
- **Is the Department's research acknowledged and visible outside the Department? Rewards and awards.**

The overall performance of the Department in terms of research during this initial period in its development is very satisfactory as described in the previous section. In addition to the above the following issues have to be considered:

(i) Although many faculty members have publication records ranging from respectable to outstanding and some have received research awards, there is no evidence of fellowships in national and international professional organisations (IEEE, AAAS, etc.) enhancing the international visibility of the Department.

(ii) The research projects undertaken in the Department involve external research partners, including other EU countries but there is no evidence of stable cooperation outside the funded projects (such as networks, concerted actions etc.).

(iii) The doctoral program has been well established according to national and international norms. It is remarkable that half of the present candidates are coming from other Universities. However, there is no formal process of advertising positions and for selecting candidates. Also, there is no uniform funding policy for doctoral students. Some doctoral students are funded by projects and some are not funded at all. The scientific output of doctoral students in terms of publications and conference participations is excellent, on average.

***Recommendation C7**:*

The Committee notes that the faculty members' level of participation to professional organisations that is relevant to the Department's objectives and its international visibility is not as well developed and the Committee recommends to improve participation of faculty staff to relevant organisations in order to establish stable networks in their filed.

***Recommendation C8**:*

The Committee recommends that the Department should improve the selection mechanism of PhD candidates and also establish uniform and fair funding mechanisms for all PhD candidates.

IMPROVEMENT

- **Improvements in research proposed by the Department, if necessary.**
- **Initiatives in this direction undertaken by the Department.**

Overall, the faculty level of research is satisfactory in terms of quality and quantity, especially considering that this is the initial period since the creation of the Department. Several faculty members collaborate internationally producing well-cited publications. However, the Committee notes that research in the Department is spread across the activities of each

faculty member, covering a large number of topics with little synergy in research activities between laboratories and/or faculty members. This behaviour hinders reaching the critical mass of staff and resources required to deliver outstanding research.

Recommendation C9:

The Committee strongly recommends that the Department identifies a small number (three to four) of major research topics and focuses its research in order to combine resources, enhance collaboration and deliver research excellence.

D. All Other Services

APPROACH

- **How does the Department view the various services provided to the members of the academic community (teaching staff, students).**
- **Does the Department have a policy to simplify administrative procedures? Are most procedures processed electronically?**
- **Does the Department have a policy to increase student presence on Campus?**

The Department is taking initiatives, within the constraints of the centralized procedures imposed by the State, to maintain and improve services to the academic and student communities. The administrative team of the Department is a dedicated and energetic group of four individuals, who work as a team, and are able to fulfill the required duties even during the occasional justified absence of one of the team members, so as not to unduly delay administrative processes. The technical team that has normally two members of staff is now down to a single individual due to the unauthorized absence of one of them. This represents a weakness that requires the urgent attention of the Polytechnic School and the University.

The Department administrative team has initiated a process to increase the use of electronic documentation and so far about 50% of the administrative documentation is electronic with a higher percentage for the most recent years. The administrative team of the Department has a process to enhance the electronic data documentation, especially for new documents, and is open to the use of best practices.

The Department administrative team and most faculty members maintain an open-door policy to the student body, thereby enhancing the quality of the academic environment and faculty-student interaction. Several faculty members organize student visits to related industries and other universities in Greece and abroad, and this was well received by the students. Many students are able to draw topics for their diploma thesis from industrial problems generated through faculty assistance and brief visits to local industries. The committee interviewed a large group of undergraduate students who came to the meeting on a voluntary basis and who were articulate about their own academic and student-life related affairs. This is considered as a good sign that the student body is involved in the affairs of their Department, and as a consequence the student presence on campus is satisfactory.

Doctoral students are in frequent contact with their advisors and laboratory colleagues, have

opportunity to attend and present papers at scientific conferences in Greece and abroad, thereby broadening their experience and acquiring much needed skills.

Regrettably, the Committee was unable to visit the Department and other centrally supported services such as the Library and IT facilities due to the occupation imposed by the student Union that coincided with the Committee's presence in Xanthi. Hence, the Committee cannot draw any conclusions in relation to these services.

IMPLEMENTATION

- **Organization and infrastructure of the Department's administration (e.g. secretariat of the Department).**
- **Form and function of academic services and infrastructure for students (e.g. library, PCs and free internet access, student counseling, athletic- cultural activity etc.).**

The administrative team of the Department operates very well and is organized with efficiency to carry out its duties. No major changes are suggested on this front.

Academic services and infrastructure for the students need some enhancement as for example access to digital libraries of major journals (eg. of IEEE, ASME, SME etc) and these ought to be implemented at the Polytechnic School or University level, or even on a country-wide level, to allow better negotiated rates.

Support of the electronic network within the DUTH needs some enhancement to allow its continuous operation and quick recovery after failure, especially during nights and weekends, and this is an issue to be addressed at a University level. Student counselling needs to be also implemented at the Polytechnic School level in Xanthi, as this is a common service required across Departments.

RESULTS

- **Are administrative and other services adequate and functional?**
- **How does the Department view the particular results?**

The administrative services of the Department are adequate and functional. The technical support staff contributions to the Departmental programme need to be enhanced, and the Committee has made this clear to the Department during the visit.

IMPROVEMENTS

- **Has the Department identified ways and methods to improve the services provided?**
- **Initiatives undertaken in this direction.**

The Department is interested in improving and strengthening these services and the administrative and technical group of staff has a positive and forward-looking attitude to achieve improvements. This team spirit is a particular strength and should be nourished and maintained. Electronic documentation should be enhanced and would further streamline the administrative load. Such efforts are already in place and are applauded by the Committee.

Collaboration with social, cultural and production organizations

Please, comment on quality, originality and significance of the Department's initiatives.

Efforts by many Department faculty members to involve students with industrial projects are already bringing good fruit and should be further encouraged and generalized to all Departmental faculty. The DPME should make it a priority to educate engineering students who, by the very nature of their education and profession, should be systematically exposed to industrial projects. This would enhance student learning and motivation, lead to a more peaceful and effective academic environment, and would also increase the professional career opportunities of the graduates.

E. Strategic Planning, Perspectives for Improvement and Dealing with Potential Inhibiting Factors

- **Potential inhibiting factors at State, Institutional and Departmental level, and proposals on ways to overcome them.**
- **Short-, medium- and long-term goals.**
- **Plan and actions for improvement by the Department/Academic Unit**
- **Long-term actions proposed by the Department.**

The External Evaluation Committee had opportunities to study the self-evaluation report of the DPME at DUTH, listen to presentations by the Department Chair and its faculty members, and held interviews with the departmental administrative and technical staff as well with a large group of undergraduate students, doctoral candidates and alumni, in addition to extensive group and individual discussions. Consequently, the committee considers to have had enough data to respond to the questions of the HQA as shown below.

By way of introduction, the DPME is the youngest department of the DUTH Polytechnic School, and the definition of its identity underwent some oscillation ranging from manufacturing management to mechanical engineering. However, the Department leadership, faculty members and other stakeholders have for some time transitioned to a common understanding that the central focus of the Department is and will remain production engineering and management connecting the academic endeavor and industry, as in the foundational origins of the Department.

At the state level, the economic hardship that Greece faces has had as consequence the reduction of the Governmental financial support from that envisioned in the foundational legal framework. Another difficulty also relates to the present regulation of the engineering professions by the state in Greece and there is some lack of clarity on the role of graduates of DPME as professional engineers. Such clarification would enhance the attractiveness of the Department to potential future students with higher entry scores as this would be related to expanded career opportunities.

At the institutional level, a significant factor is the insufficient coordination in the use of resources within the Polytechnic School, including teaching spaces (classrooms and teaching laboratory spaces and equipment) and technical staff. The Department also wishes to expand its faculty members but recognizes that under the present budget outlook, it would have to make the Department attractive so that faculty members from other Departments /

Universities will choose to transfer to its ranks.

Goals of the DPME include: (1) Approval of the internships proposal, submitted to the Ministry of Education; and the establishment of an alumni society, in the short term. (2) Establishment of a postgraduate program curriculum and the reinforcement of the departmental staff, in the medium term. (3) Elevation of the departmental recognition among production engineering departments of the south European and Mediterranean regions, by offering students a wide area of specializations, innovative product and process development opportunities and broader and improved employment pathways, in the longer term.

An important immediate action for improvement by the Department is the strengthening of an "info-day" (probably at the beginning of each academic year and separately for the students of each of the five program years). There, the Department Chair and other faculty would explain the curriculum philosophy and structure to the students and how different disciplines are interweaved to educate students in some depth in production and management engineering. Alumni participation is envisioned to inform students of the practical application of their studies in their professional career.

Long-term actions for improvement proposed by the Department include: (1) Maintain a team spirit between all staff and enhance the accessibility of students to the faculty. (2) Dissemination of departmental plans, and contributions to the main stakeholders, including students, alumni, industry and professional societies that will project an image of the unique identity of the Department and its contributions at the local and national levels. (3) Effective bi-directional communication of the Department with alumni and industry to establish its long-term relevance to the region and the country.

Summary recommendations of the evaluation committee:

Recommendation E1:

In the short-term horizon, a process for the better and interlinked management of existing space (classroom, teaching lab space) and technical support staff available within all the Departments of the Polytechnic School should be introduced, promoting cooperation among Departments and the Dean of Engineering, with the involvement of the Rector's office.

Recommendation E2:

In the short-term, the initiation and practical support of industry internships for undergraduate students needs to be considered as a priority action.

Recommendation E3:

In the medium term, the Department needs to establish a process of internal evaluation, so as to become ready for the accreditation process by HQA with suitable interactions with the sister Department at the Technical University of Crete and understanding the best practices of other Universities with similar departments, internationally.

Recommendation E4:

In a longer term, greater integration in the instruction of early fundamental subjects within the first 1-2 years of undergraduate study within the Polytechnic School would enhance quality and provide resources for other initiatives without significant new budget allowances.

Recommendation E5:

In the longer term, the Department needs to establish its unique signature regarding its

research, education and industry outreach, in order to acquire and maintain an edge in the increasingly competitive academic environment within the country and the EU.

F. Final Conclusions and recommendations of the EEC

Conclusions and recommendations of the EEC (Committee) on:

- **the development of the Department to this date and its present situation, including explicit comments on good practices and weaknesses identified through the External Evaluation process and recommendations for improvement**
- **the Department's readiness and capability to change/improve**
- **the Department's quality assurance.**

The evaluation of the DPME at DUTH took place during a very difficult time for the country as a whole, with obvious resource constraints arising from the financial crisis. The Committee understands that the operating and equipment budgets of the Department have been drastically reduced. Another pressing issue is the presence of only one (1) technical member of staff for the entire Department that poses obvious difficulties in executing the experimental and laboratory functions of the Department and also has health and safety implications. The observations and conclusions of this Evaluation should be seen in this light.

Overall, the Committee considers that the Department is doing a very satisfactory job in terms of carrying out its core tasks, teaching and research, especially when considering that it is in the early stages in its development. DPME staff is generally well motivated across functional roles, the number and quality of the students is good and the Department occupies a nationally important niche area. There is a direct and vitally important role that the DPME can play in the promotion of technological innovation and business competitiveness for regional and national development and growth, assisting both SMEs and larger companies in all branches of the Greek economy.

The Committee has made numerous recommendations in the previous sections above. All these would need to be considered by the Department. Herein, the Committee wishes to restate and stress a selected number of key recommendations as follows:

Recommendation F1:

The Polytechnic School and the University would need to urgently consider the issue of resolving the shortage of technical members of staff in the Department, that approaches a "single point of failure" condition, possibly by the internal re-allocation of technical staff from other Departments.

Recommendation F2:

The Department would need to be pro-active in the identification and implementation of improvements and best practice in all aspects of its operation. It is fair to say that many improvements can be done without incurring any direct cost and this has to be a priority for the leadership of the Department.

For instance, the re-organisation of the way staff are dealing with the delivery of the curriculum and the better communication of the curriculum to the students are two typical examples that will deliver direct benefits in terms of the teaching and learning quality without incurring direct costs.

Recommendation A1*: An explicit document showing how the curricular objectives are 'translated' into competency-based learning goals, and those in turn clustered into courses serving a meaningful whole is missing and is advisable.* The Department's Internal Evaluation Report does not indicate the existence of an annually updated **Study Guide** that provides such information for all years.

The courses during the first two years would need to be understood as providing the broad based engineering foundation and after that point the courses would need to be codified and clustered into three thematic streams that correspond to the planned Divisions. The streams would need to be developed in such a manner that a core competency is created based on the combination of several courses, and this would need to be defined and explained to the students. Hence, the streams will provide the in-depth coverage of the thematic disciplines and would enhance the niche presence of DPME graduates in the economy and the profession.

Recommendation A2: *The Committee recommends the strengthening of the Departmental identity as a Department of Production & Management Engineering, driven directly from its mission statement.*

Providing clarity of what is the identity of the Department is an essential way to instil pride in its staff and students and increase their motivation to progress.

Recommendation B1.1:

The Department must make efforts to improve student class attendance and participation. This can be achieved by changing the student advising process but more importantly by changing the testing and course examination system. A continuous assessment element can be an effective method to enforce not only participation in lectures but also improve the quality of the educational and examination process.

Recommendation C1: *The Committee recommends that the Department should formally define its research strategy to provide clarity to its members in terms of its research direction and priorities. The Department could introduce means and measures to explore appropriated strategies using also external experts.*

This is important, as DPME is at the early stages of its development and consequently several of its laboratories have not reached the critical mass required to become nationally and internationally competitive. The strategy should include the prioritisation of investment and should combine considerations such as the quality of journal papers, the creation of patents and the track record of research income generation.

Recommendation E3:

In the medium term, the Department needs to establish a process of internal evaluation, so as to become ready for the accreditation process by HQA with suitable interactions with the sister Department at the Technical University of Crete and understanding the best practices of other Universities with similar Departments, internationally.

This is vitally important in order for the Department to maintain its place in the national framework of technical education and research in this area.

Members of the Committee

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