A COLLABORATIVE APPROACH TOWARDS HIGHER EDUCATION QUALITY IMPROVEMENT: CAS-LBUS PARTNERSHIP IN VIEW OF COMPETENCE DEVELOPMENT

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ABSTRACT: The aim of the paper is to provide a new perspective on the transition from higher education to employment by conducting a survey in order to identify the strengths and weaknesses in the public-private cooperation. The study is meant to highlight an employer’s perspective of the current ability of higher education institutions to meet the demands of the competitive market; identify to what an extent educational suppliers manage to keep up with the latest advances in R&D departments; as well as to focus on the joint activities and new study programs / courses introduced in the curriculum entailed by the Conti-LBUS partnership.

KEY WORDS: public-private partnership; higher education and employment; curriculum enhancement

1. RATIONALE FOR PUBLIC-PRIVATE PARTNERSHIP IN VIEW OF COMPETENCE DEVELOPMENT

The aim of the Lisbon Strategy – an action and development plan set out in 2000 – was to help make the EU “the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment by 2010.” [2] The Lisbon Agenda is heavily based on the economic concepts of: innovation as the vector of economic change; the learning economy; as well as social and environmental renewal. The learning economy is a relatively new concept whose core idea is knowledge as an essential element for the development of both society and economy, thus entailing a new and more dynamic vision of society. Thus the Lisbon Strategy places great emphasis on adaptivity (evoked by flexibility and quick decision making processes) as an essential skill for coping with the information society associated with advanced education and training in view of preparing human resources for the knowledge economy in view of competitive market and higher employability. As regards research, the Lisbon Treaty, which came into force on 1 December 2009, advocated the establishment of a European Research Area in which researchers, knowledge and technology circulate freely.

In this context, the science triad / knowledge triangle, as an integrated approach to education, focuses on the interdependence among the cycle components: higher education – research – innovation. (figure 1) High-quality research, innovation and creativity, pushing the frontiers of knowledge – all these are common denominators of both academia and industry, although their vision and values may differ to a greater of lesser extent; high-performing economies are usually associated with top-ranking higher education institutions. “Innovation implies change in order to take full advantage of existing knowledge … In a static environment (structures) innovation depends on the implementation of existing knowledge that defines the technological and organizational frontier; in a dynamic world (processes) it is possible to push the frontier out thanks to research and due to

The expansion of higher education lately has entailed implications for all levels of society: social cohesion and integration of citizens on the labor market; social equity and widening access to tertiary education, as well as economic policies. Nowadays, Higher Education Institutions (HEIs) are open and dynamic organizations whose mission and role – on the local, national, regional and international context – have changed as education has become largely available to citizens due to the widening participation strategy. Furthermore, universities hold an enhanced role in the knowledge society and the global change economy. In this context, “higher education and research have become inextricably linked to the notion of progress and innovation, both for the individuals and society.” [1]

The partnership between university and industry is also meant to facilitate and improve the transition from invention to innovation – of products, services or processes – in view of attaining growth, profitability, increased visibility, competitive advantage and market stability.

A prerequisite for meeting the objectives of the Lisbon Agenda is to redesign the interaction between higher education and society. HEIs need to focus outwardly, since knowledge is no longer merely a private good but also a public good and a
commodity, a tangible asset that helps the advancement of society and the attainment of competitive edge for industrial and non-industrial organizations.

The present study is meant to further analyse the relevance of a public-private partnership, more specifically an examination of HEIS engagement with community and the diversity of stakeholders. We have previously looked at the theoretical background and practical outcomes of the collaboration between an academic institution and an industrial organization.

Therefore, in the present paper the authors have set the task of an in-depth analysis of the partnership between HEI and an engineering organization (automotive) from the vantage point of employee, i.e. university graduate, and employers. In this respect, we have designed and conducted a questionnaire-based survey in order to identify the strengths and weaknesses in such public-private cooperation. The aim of the case study is to increase and improve graduate employability, enhance awareness of graduate positioning in relation to employability and entrepreneurship, as well as to identify solutions for harmonising the academic curriculum with the current market demands.

2. VALUE CHAIN ANALYSIS

On the basis of the above-mentioned considerations, let us call attention to the topicality and relevance of the Humboldtian university pattern, recently “revived” as the most successful solution for academic competitiveness in the current context. The Humboldtian principles advocated: unity of teaching and research as well as the unity of science and scholarship. Nowadays, the major components of the knowledge triad are integrated in the prerequisite functions of the university and its generated relevance to the society. More specifically, both academic organizations and teaching staff need to become actively involved and engage themselves in: teaching activities able to provide key competencies and continuously correlated with the requirements of the contemporary labor market; research projects meant to foster and promote creativity and innovation particularly highlighted by the partnership between university and industry. Industrial and non-industrial organizations engage in a great number of activities in the process of converting input to output by means of educational processes and training programs meant to provide key competencies enabling individuals to compete on the market.

3. BEST PRACTICE IN PUBLIC-PRIVATE PARTNERSHIP: LBUS-CAS COLLABORATION

• Suffice it to say that there is still great untapped potential in the public-private cooperation. However the present paper aims to shed more light on one of the most successful partnerships initiated and effectively developed between an academic institution and an industrial organization. The added value of such an analysis is that it transgresses the boundaries of theoretical approaches and assumptions. Instead it highlights the benefits of an existing and mutually rewarding partnership – academic/industry cooperation – that, in the long run, rendered the following outcomes:
  • developing joint research projects
  • focus on competence development and curriculum design, correlated with the demands of the market
  • promoting excellence

This section is meant to highlight best practices of a win-win partnership - grounded on the cooperation contract concluded between Lucian Blaga University of Sibiu and Continental Automotive Systems – that “has successfully brought together academia and industry to foster development and transfer of ideas and to provide specialized and special-focused training for undergraduate and graduates enrolled at LBUS and CAS employees, as well”. [2]

Here is a summing up of collaborative activities jointly initiated, supported and developed by Continental Automotive Systems and Lucian Blaga University of Sibiu as well as the significant outcomes:

• Company presentations – meant to strengthen students technical know-how; promote company opportunities and recruit qualified students for the summer practice program; such an activity represents an alternative to traditional methods of recruitment, thus giving the employer the chance to train future job applicants during a brief period of internship
• Job shops – promoting employment opportunities and recruiting suitable candidates for available jobs or internships
• Open door activities – LBUS students visit the Conti location
• Student summer practice – organizing a 3-month internship for students during the summer holiday
• Graduation projects – LBUS students may undertake research for completion of their graduation projects and they are employed at Continental for 5-6 months
• Curriculum design and development
  o Applied Electronics – BA study program designed to meet the needs and requirements of Continental Automotive Systems (graduating its first class in 2011)
  o Courses – included in the compulsory curriculum - delivered by Continental Sibiu specialists:
    ▪ Communication techniques and public relations
    ▪ Embedded systems
    ▪ Technologies and equipment used in electronics
    ▪ Digital electronics
    ▪ Analog integrated circuits
  o Courses delivered by LBUS professors to Continental employees:
    ▪ Image processing
  o Optional/extra-curricular courses included in the additional Continental curriculum
    ▪ Microprocessors in automotive (30 graduates in 2010)
    ▪ Embedded software (12 graduates in 2010)
    ▪ Electronic hardware in automotive (50 graduates in 2010)
• Conti info centre – a permanent info stand in universities
• Conferences – participation at a number of international conferences by scientific presentations
• Sponsorship – sponsor different events (e.g. academic competitions, conferences)
• Conti scholarship – award scholarship to best performing students
• Supporting Conti employees in continuing education – MA study programmes at LBUS
• Academic competitions – Continental as main partner in organizing different academic competitions
  o Implement a road recognition vehicle: 12 teams of 40 students from 4 universities (Sibiu, Brasov, Cluj, Craiova) designed and implemented an embedded application to control a car on a predefined route
  o Conti mechanical design contest: teams of students from 3 universities designed an embedded application to control a car on a predefined route, evaluating CATIA competences
  o Hardware and software engineering: Computer Science students present their SW- and HW-related projects to a technical committee; the first prize is awarded by Continental as main partner of the competition
  o Student competition organized by the Technical University of Civil Engineering of Bucharest: Continental sponsored 2 teams from LBUS which ranked 1st and 2nd in the national competition and 13th 23rd in the European competition
• Conti day – recruitment event organized by Conti Sibiu in the main lobby of the Hermann Oberth Faculty of Engineering including stand, company presentations and other student-related activities; the main goals are: promoting the company as a major partner of LBUS as well as promoting company opportunities and recruiting the best qualified students for internship programs
• Conti lab
• Conti-funded teaching loads: 1 professorship and 1 assistantship

4. CASE STUDY: QUESTIONNAIRE INTERPRETATION / SURVEY ANALYSIS
See survey results – 2 annexes

5. CONCLUDING REMARKS
An important criterion in the field of educational effectiveness of an academic organization is the degree of capitalizing learning results and academic degrees, i.e. acquired knowledge, skills and abilities/competencies in view of a better integration into the labor market, enabling graduates to continue their professional development and encouraging entrepreneurship. Furthermore, higher education performance indicators are better and more fluently met by alleviating gaps between theoretical and practical knowledge. Connecting academia to industry highlights the relevance and of higher education system and its added value to the community so that is wins the support of all stakeholders.

“Universities in many countries are now being encouraged by government to adopt a more corporate type of organization, with a stronger central administration, better ties to external stakeholders, and greater independence in the management of their internal affairs – entrepreneurial university”. [4]

REFERENCES
2. Eva-Nicoleta Burdules and Lacramioara Daraban, Aurora Sere-Schneider, Markus Schneider, Theoretical Perspectives and Outcomes of the Collaboration Between an Academic Institution and an Engineering Organization. Case Study: Lucian Blaga University of Sibiu – Continental Automotive Systems Partnership, 5 Balkan Region Conference on Engineering and Business Education&2nd International Conference on Engineering and Business Education Sibiu, Romania, 15-17 October, 2009
Annex 1

Hermann Oberth Faculty of Engineering
Graduates Satisfaction Survey
Analysis Report

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Evolution of the annual student satisfaction survey.

The survey took place between December 13th, 2010 and January 14th, 2011.

The response rate for the graduates is 89%, in total.

For Plant, the response rate is 76%.

For R&D, the response rate is 90%.

The current report contains analysis for each question presented in the same order like in the questionnaire.

At the end, the conclusions for both surveys are presented.

The 86 graduates seem to have difficulties in solving daily work activities.

For 55% of the respondents, it is sometimes difficult to solve daily tasks using the knowledge gained in the university while 30.6% declared that they have this problem often. Also, 20.6% do not seem to have this problem at all.

From the comments of the respondents we summarize that there were some difficulties in solving daily work activities using the knowledge gained in the university, mostly in case of some big development projects or very complex tasks.

Satisfaction with the study programs

For more than half (54%) the respondents the study programs are medium, while for almost 40% of them the satisfaction is high, very high for 3.5%.

The participants with a medium satisfaction toward the study programs urged that “courses are too much focused on theory and less supportive for real world projects”. Also, they expect more practical oriented seminars (Billy & seminars to cover what is presented in the class).

Relevant courses to professional activity

Here are the most relevant courses for the graduates:

- Microcontrollers and microprocessors
- System and computer architecture
- Analog electronics
- Digital electronics
- Power electronics
- Graphic design and technical drawing
- Embedded systems
- CUDA/CAT
- Artificial intelligence
- C/C++ programming/ languages and techniques
- Others (see complete list here)

Necessary courses graduates wished they had been offered

- Embedded computing
- Microcontroller programming
- VHDL builder programming
- Introduction to programming languages
- Courses on new/emerging technologies
- Automation
- System development (software design, implementation, integration and requirements)
- Graphics (2D/3D approach)
- Web based courses (a real approach)
- Multimedia and hardware
- Databases (stored procedures, SQL, DB maintenance)
- Scripting (Perl, Javascript, Actionscript)
- Testing

Courses offered in different study programs

Key competencies students lacked and would have been helpful for professional assignments

- Electronics
- More experience in Embedded Systems
- Hydraulics
- Project management

Others competencies mentioned:

- Communication skills
- Testing
- Quality Management Systems
- Web-based App
- Metronics
- SAP
- View Management, Building Skills Leadership
- Mechanics
- IBM development process
- Measuring devices
- Test equipment & test systems
- Computer assembly
- Practical experience
- Industrial training in FME evaluation
Willingness to attend further academic study programs

- 80% of the respondents said that they would like to continue their professional development by attending further training programs. Those respondents are open for continuous improvement and they see the university as a way of improving skills & vision.

- Willingness to attend further academic study programs

- On the other side, 20% from the respondents would not like to continue their studies being based on the idea that their current study was the best.

- Satisfaction towards assigned work activities

- 80% of the graduates are satisfied with the tasks assigned; these tasks are meaningful, challenging, and provide them with opportunities to develop their skills.

- Added – value work assignments

- Identify any work-related assignments that added value to your educational background and/or work experience
- Working with ESI/P: improved knowledge in electronics
- Team-working
- In general, all tasks added value
- Training

- Education level offered by LUBS compared with other universities

- For most of the graduates (62%) the education level offered by LUBS is good, while for 24% it is satisfactory. They would like to have better prepared practice programs and better equipped laboratories.

- Conclusions

- Both graduates and team leaders acknowledge that there are sometimes difficulties in solving tasks mostly due to the lack of practical knowledge, electronics, C++ programming.

- Overall the graduates are satisfied with the education level offered by LUBS which they consider good or satisfactory. This fact is also reflected in the team leaders opinion which are satisfied with the overall professional/scientific background of the LUBS graduates.

- The most important opportunity for improvement observed by graduates and also team leaders is the focus on practical courses which could bring better electronics knowledge, measuring devices handling, C++ programming.
Employer Satisfaction Survey Regarding Hermann Oberth Faculty of Engineering Graduates

Analysis Report

Annex 2

Desired competences when joining company

- There are several competences mentioned by the team leaders as a "must have" for the young graduates:
  - Basic electronics knowledge
  - Measuring devices (e.g., oscilloscope, multimeter, etc.)
  - E/C knowledge
  - Practical electronics/Electrical mechanics
  - Microcontrollers (architecture & programming principles, signal processing)
  - Technical CAD software
  - Embedded systems
  - Metals / hardline / target/tracking software development knowledge
  - Basic UML
  - Practical experience
  - Others (CAN, Car, IT, Automation, Diagnostics, Networking, Flash Reader, Scanning, Photos, Java, Matlab, IT3 design)

Curriculum relevance

- Convening team leaders think that the LBUS curriculum has a medium relevance for the automotive field.
- Also here we notice the lack of the specific knowledge of the LBUS graduates.

Relevance of the automotive/electronics courses

- The relevance of the specialisation courses is seen as median by 46% of the respondents.
- There is also an important part (38%) which finds it high.

LBUS ability to prepare graduates

- Most of the people (53%) agree that LBUS is able to prepare graduates for the employability.
- Almost 40% do not have an opinion regarding this aspect.

Lack of practical expertise of LBUS graduates

- The lack of practical expertise of the LBUS graduates is evident for most of the team leaders (69.54%).
- They claim the lack of practical expertise in:
  - Programming
  - Basic electronics, hardware knowledge
  - Electronic CAD software

- As well as the graduates, they suggest more practical courses based on current requirements.
New entries ability to integrate into teams

- LBUS graduates proved good integration abilities (97%).

Company approach towards lifelong learning

- Continues a good to excellent approach towards lifelong learning.
- People appreciate the internal/external training programs, offered to employees.

Overall professional & scientific background of the employees (LBUS graduates)

- LBUS graduates have good or satisfactory scientific background.

Own approach towards lifelong learning

- Good approach towards lifelong learning from the team leaders.