

Creating means and motivation for networking- continuing education programs for engineers based on professional standards (experience gained from projects implemented in a small country)

The paper outlines the experience of building partnerships and networking from three continuing engineering education development projects implemented in Estonia. The focus of the projects was creation of network between entrepreneurs, educational institutions and qualification authority for creation of integrated continuing education system where training programs are suitable for professional training but also for applying professional qualification, raising the participant's educational level or retraining. Deriving from the wide goals of the projects the key success factor of implementing the projects was motivating the project partners for efficient cooperation. The paper provides overview of the main motivating aspects of partners identified during the projects, means of cooperation used in analyze and program creation activities also the difficulties encountered.

Introduction

The literature and everyday practice identifies several major trends the universities are facing nowadays. Depending on the approach adopted, the trends may be seen as threats or opportunities. The approach may be passive, waiting for trends to disappear or settle, the trends tend to become threats. If the approach is proactive, focused on finding solutions how to adapt faster and better than the competitors, the trends may become great opportunities.

The main trends relevant to this paper are identified as follows;ⁱ

- new requirements of the knowledge based society that lead to the transformation of the traditionally elitist higher education system towards the mass higher education
- the public financing decline;
- the increase of the demographic, social and economic diversity;
- the request for adult education;

As mentioned by Donald E. Hanna ⁱⁱ the higher education market is neither defined any more as preparation for life and career nor centered on a population of young students. The very rapid changes in the present economy create the increasing request for adult education. The training needs that universities are expected to meet are highly diversified, which implies a dynamic, entrepreneurial and cooperation oriented organization. For the relatively conservative structure and slow decision-making of university these expectations have proved to be a challenge.

The paper is based on three projects carried out between 2005 and 2008 by wide-spread consortiums, the main data of the projects is presented in the following table:

Title, dates and financial amount	Partners	Main results
Continuing education system of engineers in	Tallinn Univ. of Technology;	- comparative analyze of curriculums and professional standards , study of training needs

<p>the field of civil engineering based on professional standards, 05/2005 – 06/2007, amount 99 000 €</p>	<p>Estonian Agricultural Univ.; Tallinn College of Engineering; Qualification Authority; Union of Engineers; Union of Construction Engineers</p>	<p>among engineers; - creation of network; - creation of integrated training system that is suitable for applying professional qualification, gathering credit points for BA or MA, retraining or further training; - creation of 4 continuing education programs in the fields of structural engineering and building technology, engineering design and production, transportation engineering, environmental engineering</p>
<p>Continuing education system for vocational teachers in the fields of engineering and technology 09/2005-05/2008, amount 122 000 €</p>	<p>Tallinn Univ. of Tech.; Tallinn Univ.-teacher training; Tallinn Coll. of Engineering; 3 vocational schools; Furniture Industry Association; Transportation and Road Union; Federation of Engineering Industry; Examinations and Qualifications Centre</p>	<p>- development of continuing training system for vocational teachers that is suitable for retraining or further training, gathering credit points for BA or MA; - development of 3 competence centres with appropriate network for training of vocational teachers - Material technology, timber processing; metal processing and mechatronics, machinery - development of training programs for vocational teachers in the abovementioned fields, accompanied with metodological guides and other training materials for teachers</p>
<p>System of energy auditing and issuing energy labels, training of energy auditors and trainers</p>	<p>Tallinn University of Technology; Ministry of Economic Affairs; Association of Heating and Ventilation Engineers</p>	<p>- creation of the energy auditing system, forms and guidelines according to state and EU legal background; - creation of the system, forms and requirements of issuing energy levels for constructions; - creation of the professional standards of energy auditor and energy label issuing specialist; - development of training program for energy auditors; - training of trainers for energy label issuers</p>

The cases reported here represent quite similar approaches to building university-business-professional association relations. The projects were initially presented by academic institution leading the work, but were then subject to cross examination by partner representatives and invited experts.

The role, challenges and motivating aspects of networking for university

Tallinn University of Technology has carried project initiation and management role in all of these projects. Projects have been financed through different European Union Social Fund and Cohesion Fund financing measures, civil engineering and vocational training projects also included 25% self-financing of university and partners.

The most important motivational aspect behind these projects has been the challenge to **homogenize the level of knowledge of engineers and specialists** in the field on technology deriving from the different levels of university graduates in the last 20 years. The differences derive from the reformations of study process at Estonian universities have taken place in connection with the restitution of independence, introduction of changes to legislative acts and implementation of curricula system based on the Bologna declaration. The changes have been followingⁱⁱⁱ:

1. Transition from the year-based system to the curriculum-based system in studying process arrangement (until 1990).
2. Adoption of the system 'Engineer-Master-Ph.D.' with nominal duration of studies 5 (180 credit points) +2 +4 years (since 1991).
3. Adoption of the system 'Bachelor-Master-Ph.D.' with nominal duration of studies 4 (160 CP) +2 (40 or 60 CP) +4 years (since 1995).
4. Adoption of the system 'Bachelor-Master-Ph.D.' with nominal duration of studies 3 (120 CP) +2 (80 CP) +4 years (since 2002).

The differences in the amounts of credit points acquired for graduation at bachelor level has created a **need for multi purpose continuing education programs** which even out the differences in the preparation of BA graduates with the former engineer level graduates, and also offer a chance for the 4 and 3 year BA graduates to gather points for MA program. This possibility is especially important for 4 year BA graduates because they have already entered the labour market and only a few of them has applied for MA so far, also many of the 3 year BA graduates decide not to enter masters program immediately after graduation.

Connecting continuous engineering education programs with the professional qualification system of engineers is a good possibility to set a common standard for the level of knowledge and experience of engineers. Receiving approval for the training programs from the professional authority has created additional advertising for our programs.

Main challenges encountered by the university in these projects are in many cases similar to those identified in previous university-industry networking^{iv}:

- coping with the **different educational background of the target group**;
- coping with the **multi-disciplinary context of the training needs** with inputs from economics, organization theory, information technology, enterprise and project management issues in addition to field specific issues;
- the **development of a common language of knowledge management** between experts and academics for dialogue within the networks and also for practitioners later in each organization;
- reconciling the preference of academic participants for conceptual ideas and business practitioners for real-world applicable ideas;
- there is **heavy dependence upon the personal relationships** of a few key individuals;
- constant **refreshing of new members** and integration into existing networks needs careful planning; as well as a constant refreshing of themes and topics;
- concerted efforts are needed to **ensure the delivery of benefits** to partners.

The activities taken through to encourage networking were substantial, financing provided by funding agency has been indispensable, activities in such amount could not have been implemented without external financing.

The role, challenges and motivating aspects of networking for qualification authority and professional associations

The objectives of the qualification authority are to facilitate the establishment and development of professional standards, evaluation criteria and bringing education and training in accordance with the requirements for professional skills. There is strong mutual interest between universities and professional associations in the development of training programs. The professional associations wish to ensure quality and practical orientation of the trainings offered to their members. Universities benefit from the analyze and experience delivered from the entrepreneurs who belong to the associations, their suggestions can be taken into account in curriculum and training program development.

The main motivational aspects in the cooperation have been:

- **Control over the quality of training programs** – In all projects the professional associations have participated in the design and evaluation of the training programs.
- **Identifying development needs of the professional standards** – The civil engineering project identified that the existing professional standards of civil engineers need several new sub standards, because a general standard does not meet the expectations of legal acts implemented in the field. Also projects identified some cases, where professional standards or legal acts do not take into account alternative ways of entry into the career than university education, those have become restrictions in the development of the economic field.
- **Information about developments in the field** - The energy audit project revealed that professional association benefited from networking in preparing professional standards by acquiring access to experts and information, especially about the future developments in the field and necessary qualifications deriving from that.
- **Unifying the training activities of the associations with university training programs-** The professional associations also provide shorter trainings for their members, some trainings were unified with the university initiatives, approved by faculty and appointed with credit points, creating a additional value for the participants.

The cooperation has also revealed some difficulties. Most important of those is the weakness of some professional unions and the networking of their members, in the situation of lack of basic funding for the organizations, the level of expertise presented, is various and depends too much on the personal qualities of the leaders. In some cases the professional standards were not detailed enough to get sufficient information about the requirements for skills. These situations needed concerted efforts of additional experts to specify the expectations of the professional authority. At first we also encountered some resistance for cooperation by the staff members of professional authorities, because a significant amount of their income comes from training activities for the members. At first the initiative of university was considered as a threat to their income, later, during discussions, it was possible to find common interests and reduce resistance.

The major trends **motivating entrepreneurs for collaboration** are:

- increasing awareness by corporations of the importance of their employees and of their development;

- getting a **clear overview of existing and missing skills**;
- getting a clear overview of the training options; planning the career and professional development;
- developing less structured and more **context specific training** and development interventions;
- safety through professional certificate;
- remuneration based on the qualification (orientation to the future);
- setting up **stronger links to competence frameworks**;
- moving from open to **“in-company” externally accredited programs**.

Such trends are seen as publishing towards developing corporate training, increasing the use of new technology, increasing outsourcing of major HR functions and as the most important part - changing buyer-supplier relationships for true intensified and diversified partnerships between businesses and universities.

Conclusions

The main conclusions of the projects are that **university is a well suitable institution for coordination of networking activities**. The goal of creating an integrated continuing education system, that enables trainees to accomplish different aims in their life-long learning process, provides sufficient motivation for the public and private sector partners to contribute in networking.

Main conclusions for the continuous engineering education management in TUT from the projects have been:

- prefer focus group based training needs analyze to questionnaire based analyze, because of it's stronger impact to trainers and clients mutual understanding of the training needs;
- **apply funding for new network based continuous engineering training programs** development;
- establish a **“Development fund of continuous education programs”** to motivate training and teaching staff to bring forward projects of program creation that involve different partners;
- **involve the existence of continuous education programs** connected with professional standards **into the performance assessment of the faculties**;
- add the development of network and focus group management skills to the staff training plan.

ⁱ K.J. Dougherty, Mass higher education: What is its impetus? What is its impact? Teachers College Record, Vol. 99, 1997

ⁱⁱ D. Hanna, Higher Education in an Era of Digital Competition: Emerging Organizational Models, Journal of Asynchronous Learning Networks, 2 (1), 1998

ⁱⁱⁱ T. Metusala, J. Valtin „Cooperation between TUT and leading power companies, curriculum development“, European Models of Synergy between Teaching and Research in Higher Education workshop proceedings 2006

^{iv} D. Birchall, J.-J. Chanaron „Business School-Industry Cooperation: An analysis of good practice cases“ European Models of Synergy between Teaching and Research in Higher Education workshop proceedings 2006