The Development of Estonian Professional Higher Education In the Context of European Higher Education

Enno Lend[a1], Jaan Tamm[b], Kersti Kõiv[c],
Ülle Ernits[d], Kadrin Kergand[e], Jana Praun[f]
[a] TTK University of Applied Science
[b] Estonian Aviation Academy
[c] Estonian National Defence College
[d] Tallinn Health Care College
[e] Archimedes Foundation
[f] Foundation of Estonian Universities of Applied Sciences

Annotation
The weak integration of economic growth and higher education in Europe in the last few decades is expressed, among other factors, by the fact that while the number of people obtaining higher education is growing, the gap between people's knowledge and skills and the expectations of employment market is also increasing. Some areas lack quality work force, while other domains struggle with overproduction of educated specialists. The ideal education system fully matching the needs of employment market is a noble and high goal to be sought after. This research focuses on the emergence, development and possible future trends of the binary education system in Europe, focusing on the experience of Estonian professional higher education institutions. Combined research methodology was applied. Firstly, the development trends of the key performance indicators of the Estonian universities of applied sciences were analysed for the period of 2008–2013, and then semi-structured interviews with rectors of higher education institutions, members of rectors' conferences and higher education experts from several European countries were conducted.

Keywords: university of applied sciences, binary higher education system, diversity of higher education, higher education system, lifelong learning

Introduction

Today the binary education system is dominating in Europe (Machado et al., 2008). Binary education system enables the learner to obtain primary level higher education resulting in a bachelor's degree or to pass a study programme of professional higher education, which results in awarding the diploma of professional higher education. In the processes initiated by the Bologna Declaration different tendencies can be seen both in academic and professional higher education – some authors think it results in the rise of diversity in higher education (Clark, 1998), some that it the result of convergence of higher education (Birnbaum, 1983; Rhoades, 1990).

The diversity in higher education can also be expressed by the emergence of the binary education system, which in its essence evolved from the need of the society and working life. The emergence and development of professional higher education institutions in Estonia in the beginning of the 1990s has been similar to the development of binary higher education systems in many other European countries, including the developments regarding the demand of labour market in the field of preparing specialists.

The development of professional higher education started in France in 1966, from there on, the founding of applied higher education institutions started in Germany (mostly between 1969–1971), in the Netherlands in 1986, in Finland in 1991, in Austria in 1994, in Switzerland in between 1995–1997 and also in Portugal and Czech Republic in the end of the 1990s (Lend, 2012). Today's higher education institutions have, as a result of further divergence, become interdisciplinary institutions.

Therefore, the role of a professional higher education institution has been described as rather multifunctional also in the Estonian Institutions of Professional Higher Education Act: *"The functions of an institution of professional higher education are to promote lifelong learning corresponding to the needs of the labour market, to provide services including education and development, conduct applied research and help students become responsible citizens who are able to demonstrate initiative. Upon carrying out their mission, institutions of professional higher education cooperate with different institutions and actively communicate with the public, supporting the development of society through effective development and innovation as well as*

[1] TTK University of Applied Sciences, Pärnu mnt 62, 10135 Tallinn, ESTONIA, enno@tktk.ee

applied research in their field." (Institutions of Professional Higher Education Act § 2 section 4).

The compatibility of higher education system to the expectations of labour market is a noble purpose to aspire to. However, we must admit that no country has a perfectly compatible higher education system and it is unlikely that there ever will be one in our quickly developing society. The differences between the countries are rather in the ways how different states are moving towards this "ideal situation" by using either faster or more resource efficient methods or how more effective links are being established between economic and education systems.

It is not only a question of preparing specialists needed in the labour market. The situation of incompatible need and demand in the labour market comes forward in a situation where in one field, there is not enough qualified work force, and in the other, there is the overproduction of specialists by the education sector. The employer of course wishes that people entering the labour market will match their expectations and that the workers with systematic knowledge are, at the same time, creative and enable to come up with innovative solutions.

In the action programme of Estonian Employers' Confederation "The Employers' Manifesto 2011–2015" (2010), it is stated that the education system does not guarantee enough people with special qualification. Many successful enterprises have been critical about the limited skills of Estonian labour force and about the lack of talents. The notice of European Commission also states (The Official Journal of the European Union, 2012), that European school and education systems cannot guarantee the skills needed for competitiveness in the contemporary labour market and not enough cooperation is done with employers to make learning outcomes more compatible to the real working environment. The problems raised above could be solved by more efficient international cooperation. Therefore, The National Reform Programme "Estonia 2020" (2014, pp 14) brings out three primary goals for internationalization (adapted text): 1) to broaden the outlook of students, to enable them to get experiences from other countries and to apply the acquired knowledge in the labour market, 2) to bring international students in Estonia in relevant fields, and 3) to adapt national quality standards based on international experience to global educational demands.

The main goal of the present research is to give an overview of the development of professional higher education and the institutions of professional higher education in Estonia and Europe and to suggest possible development and cooperation models that would guarantee the capacity of adapting education to the constantly changing expectations of labour market.

1. Theoretical Basis

1.1. Theoretical Framework of the Diversity of Higher Education Institutions

The discussion about the necessity and possible creation of the binary education system was started by the large enterprises of France and Germany after the Second World War during the period of quick economic development. In its essence it was a perfect example of the so-called conflict of purpose – while the graduates of *universitas* type of higher education institutions had academic background, the employers were looking for highly qualified specialists with practical knowledge and skills.

Birnbaum, who has discussed the theoretical framework of the binary education system (1983), divides institutional diversity into external diversity, which stands for differences between higher education institutions, and internal diversity, which stands for differentiations inside the institutions. The diversity of higher education institutions has been a widely discussed topic in the European education landscape (Huisman, 1995, 1998; Reichert, 2009).

This kind of debates reached Estonia a few decades later. On one hand, it was the result of the influence of German and Finnish professional higher education institutions, and on the other, the pressure of local enterprises, who needed specialists with higher education and with skills to work with new technologies. In a broader context, the traits of binary education system of Europe started to take root in Estonian higher education. Estonia is no different from the other countries of Europe, stated the Minister of Culture and Education, Mr. Paul-Eerik Rummo over twenty years ago: *"/…/our trouble is that the relation of applied and academic education is undefined both in the socio-psychological and legal sphere."* (Rajangu, 1993, pp 4). In the beginning of the 1990s, the founding of higher education institutions was very intensive, mainly lining after the higher education practices of European countries and trying to implement them.

Trow (1979) claims that only when the students are offered knowledge and skills that are relevant in the working life, the higher education institutions can survive. When analysing the development of binary education system, we may claim that the representatives of economic sectors, strategic unions and enterprises are starting to be a lot more involved in the processes of developing study programmes and defining learning outcomes.

In addition, the emergence of diversity in higher education was supported by the massification of higher education. Here, the term diversity is used to refer to the variety of entities in formal education only – the differences of study programmes and institutions within a system of higher education. For example, the strategic national document of Ireland "National Strategy for Higher Education to 2030" (2011, pp 5) says that the goal is to move towards a binary education system where the higher education institutions are able to fulfil the social and economic needs of the state, which also refers to the differences in the missions and learning outcomes of different higher education institutions. The negative connotation of the diversity of higher education rather belongs to the past, to the time where the unified higher education system started to transform, where elite education changed into mass education. According to Huisman (1995, 1998), the concept of diversity in higher education is rarely used as a neutral, descriptive term.

The concept of diversity is also used in a broader sense while researching higher education institutions – in the context of describing interaction between different social groups and cultural compatibility (Gurin et al., 2002, pp 334). The scope of the current article, however, does not cover the social and cultural aspects of diversity, but focuses on the diversity of curriculum purposes, acquired competences and strategic orientation of higher education institutions.

The diversity in the learning outcomes of curricula has been influenced by the Bologna process, the implementation of which started a massive modernization wave that divided the former one-cycle higher education into bachelor and master studies (Valk, 2008). Many studies have been conducted on the effect of the Bologna reforms to educational policies and to the diversity of higher education institutions. Witte (2006), for example, has analysed external target groups and found that it is unclear whether the implementing of the Bologna Declaration and the resulting reforms have brought wider institutional diversity. Teixeira (2012) has analysed the sustainability of higher education systems and found that the most important competition factor today is the capability to offer contemporary study programmes compatible to the demands of labour market, which may become huge challenges to higher education institutions when they are too focused on traditions. It is thought that diversification of tomorrow´s education market has to be implemented through a more clear definition of the services offered by higher education institutions, like study programmes, learning outcomes and research and development activities (Fumasoli & Lepori, 2011).

In the terminology of higher education diversity is described as one of the key factors, which is related to the efficiency of a higher education system (van Vught, 2008). Normative diversity is mostly regional, meaning it gives frames to the functioning of higher education institution based on its environment of action and according to agreed criteria.

Birnbaum (1983) characterizes institutional diversity as a normative value in a higher education system, when the system of higher education:

1) is compatible to the needs of a student;
2) offers possibilities for social mobility;
3) complies to the needs of labour market;
4) complies to the policies of stakeholders;
5) allows the co-existence of mass and elite higher education;
6) increases the effectiveness of higher education institutions;
7) offers possibilities to engage in innovation.

Therefore, the competition between higher education institutions should not merely be seen as a competition over resources, but also as a competition over prestige and legitimisation through an established value system, which in turn facilitates adaptability to existing models, not an aspiration to differentiate itself from its competitors (Rhoades, 1990).

When we look at the situation in Estonia after regaining independence, we can see that the diversification of higher education has happened in two ways: the state created possibilities for the emergence of professional higher education, and the universities saw a possibility to widen their scope via colleges offering professional higher education (Valk, 2008). Today the question is more about how many different curricula the labour market really needs and to which level should the binary education system to be developed. There are already the binary master programmes in some countries as a reality and even the ideas about an industrial PhD emerging.

Regarding to the approach of EURASHE *"Professional higher education is a form of higher education that offers a particularly intense integration with the world of work in all its aspects, including teaching, learning, research and governance, and at all levels of the overarching qualifications framework of the EHEA"* (Camilleri et al., 2014, pp 24).

1.2. Professional Higher Education in the Context of Reforms

The changes taking place in higher education system in the last 25–30 years have been similar in most countries in Europe. Mostly these changes have been the result of the need for raising the effectiveness of the system, the decreasing number of young people (potential students) in higher education and the increasing role of lifelong learning. The development of Estonian higher education institutions (HEIs) has been similar to that in many other European countries. The main characteristic of professional higher education (PHE) used to be the compatibility of study programmes to the needs of labour market and the tighter relationship of the study process and working life. The labour market needed skilled specialists with higher education, which the universities could not provide. The graduates of universities had theoretical knowledge, but they lacked practical skills, the acquiring of which took time and resources (Lukas & Tamm, 2012). Therefore, the initiators of creating a more practical study process were mostly the representatives of the labour market.

When emerging, the main activity of professional higher education institutions (PHEIs) was teaching – full time studies and in-service training. Today additional tasks like Research, Development and Creative (RDC) activities, and in many European countries, including Estonia master studies are offered by PHEIs.

The development of PHEIs in the European countries has been quite dynamic both in the context of developing the content of study programmes and in developing the HEIs themselves. The main similar factor has been the more efficient use of academic personnel and infrastructure. The development process has also taken into account the need for consolidation stemming from the emergence process of PHEIs – smaller units have joined and large-scope HEIs have been founded.

With the integration of PHEIs their diversity has increased, the key words of which are interdisciplinarity, modernization of study programmes, developing international relations, RDC activities, developing study information systems, e-learning and strategic cooperation of HEIs.

In reorganizing higher education different countries have used cultural and educational solutions specific to their cultures. In most cases those cover the growing integration of PHEIs and the rethinking of the missions of universities and applied HEIs. However, it is not reasonable to develop pan-European universal cooperation models, as higher education and especially the development of PHEIs in Europe has been weakly harmonized.

According to the paradigm of qualification frameworks, it can be claimed that passing the training (either formal/non-formal etc.) is a crucial success factor for creating economic growth and jobs. During the study process the knowledge, skills and experience acquired and valued by the world of work are focused on, not the details of study programmes and institutional matters.

According to the authors of this research, the latter principle has in many European countries (Austria, Switzerland, the Netherlands, Germany, Finland) led to acknowledgeable results in enhancing PHE. For the most part this is demonstrated by guaranteeing the quality of the study process, which in turn leans on curriculum development, professional skills of academic staff and RDC activities and innovation, which support the study process. It can be concluded that the sustainability of Estonian PHEIs depends on their ability to be attractive to students and employers, at the same time guaranteeing the development of academic resources and sustainability.

In the last few years, the trend in Europe has been looking for options to harmonize the network of PHEIs and increasing cooperation. Mostly, when creating consortiums and alliances, the development of content is focused on during these processes. For example, during the higher education reform in Finland a PHE consortium has been created by the universities of applied sciences of Hämeenlinna, Lahti and Laurea. This undertaking enables better access to additional resources and increases international competitiveness (FUAS Strategy 2011–2015, 2011). In Switzerland PHE studies were introduced in the second half of the 1990s, based on 60 higher vocational schools. For today smaller PHEIs have converged into seven state and one private PHEIs. The joined institutions act autonomously and are administered centrally.

2. Methodology and Research Questions

The purpose of this research is to analyse the current situation of PHEIs and prognosticate their future according to the key performance indicators of the institutions. The development trends in the European countries have been analysed based on numerous interviews conducted with PHE experts. To achieve this goal, the following questions were asked:

1) which changes, if ever have taken place in the key performance indicators of PHEIs during 2008–2013;
2) what kind of disciplinary and/or regional international experiences do PHEIs have, what kind of models have they used and what could Estonia learn from those experiences;
3) what kind of changes in the PHE system can be predicted for 2020.

Combined research methodology has been used when compiling this paper. On one hand, the key performance indicators of PHEIs of 2008–2013 were analysed, and on the other hand semi-structured interviews were conducted with the rectors, members of rectors' conferences and higher education experts of various European countries. The data reflecting the main development trends of PHEIs were collected from Estonian education information system *HaridusSilm* and also from data presented according to common criteria by the PHEIs. Interviews with experts were conducted individually in between March 2013 to January 2014, covering the (professional) higher education systems in the Netherlands, Switzerland, Finland, Belgium (Flanders), Lithuania, Austria, Poland and Estonia. In the sampling process, the principle of choosing both the so-called old and early PHE countries and Eastern European countries (Lithuania, Poland, and Estonia) was implemented. When meeting with the interviewees, we asked them to cover nationally agreed-on, official statements that have been planned for 2020+ by the government sector. The names of the experts interviewed have been presented in Annex A, the questions of the interviews in Annex B of the current article.

During the interviews, the following main topics were focused on:

1) higher education system as a whole and the role of PHE in it; binary higher education model, common understandings of the sustainability and development of current higher education systems;
2) the profiles of PHEIs now and in the future;
3) institutional development trends of PHEIs.

3. Analysis and Results

3.1. The Statistic Overview of Professional Higher Education Institutions in Estonia[2]

In order to get an overview of the dynamics of the indicators of PHEIs in Estonia in 2008–2013, the key performance indicators were analysed in three categories: 1) general economic indicators (overall costs, total area per student), 2) students data (number of students, dropout rate, employment), and 3) RDC activities.

General Economic Indicators

The general costs of infrastructure during the period were 50–60 €/m^2. As until today, there is still no unified methodology for PHEIs for calculating the maintenance and general economic costs, the presented data is meant just for preliminary comparison. When we look at closed net area per student, then in state PHEIs, this indicator is 7–8 m^2/per student. It may be concluded that in Estonian PHEIs, the area use has been economical; according to the currently valid norms, the advised numbers for vocational and PHEIs with less than 600 students are 16 m^2 /per student, and with over 600 students, 14 m^2/per student. (Report of the National Audit Office, 10/3/2013)

Students

The period of six years under scrutiny showed that the decrease in student population in the first five years was overall 5% in the Estonian higher education system. In the last year, there was a 7 percentage point fall, reaching 59 998 students. In PHE, the decrease in the number of students has been 21% (Table 1). When we look more closely at the changes that took place during 2008–2013, we can notice that in state PHEIs, the number of students was rising up until 2011, and has been falling after that, reaching its low in 2013/2014. When analysing the changes in student numbers according to the ownership models of HEIs, it can be seen that the biggest fall has taken place in private HEIs, where the student population has decreased 53%; at the same time, the fall in state PHEIs has been 9%. The main reasons behind it is the general fall of student population, the closing down of many private HEIs and the preference of students to choose state financed study programmes, offered mainly by public universities and PHEIs.

When analysing the student population trends of PHEIs, tendencies common to the whole Estonian higher education system, like the general fall of student population, can be noticed. The number of students in PHEIs has dropped 30% when comparing 2008 to 2013; however, the rise of PHE student numbers in some colleges is a result of merging some state PHEIs with public universities (Table 1).

Table 1. Changes in student numbers in PHEIs in 2008/2009 –2013/2014

[2] Mostly the data of PHEIs has been used according to the main purpose of this research. When analysing the economic indicators of PHEIs, vocational institutions were also included.

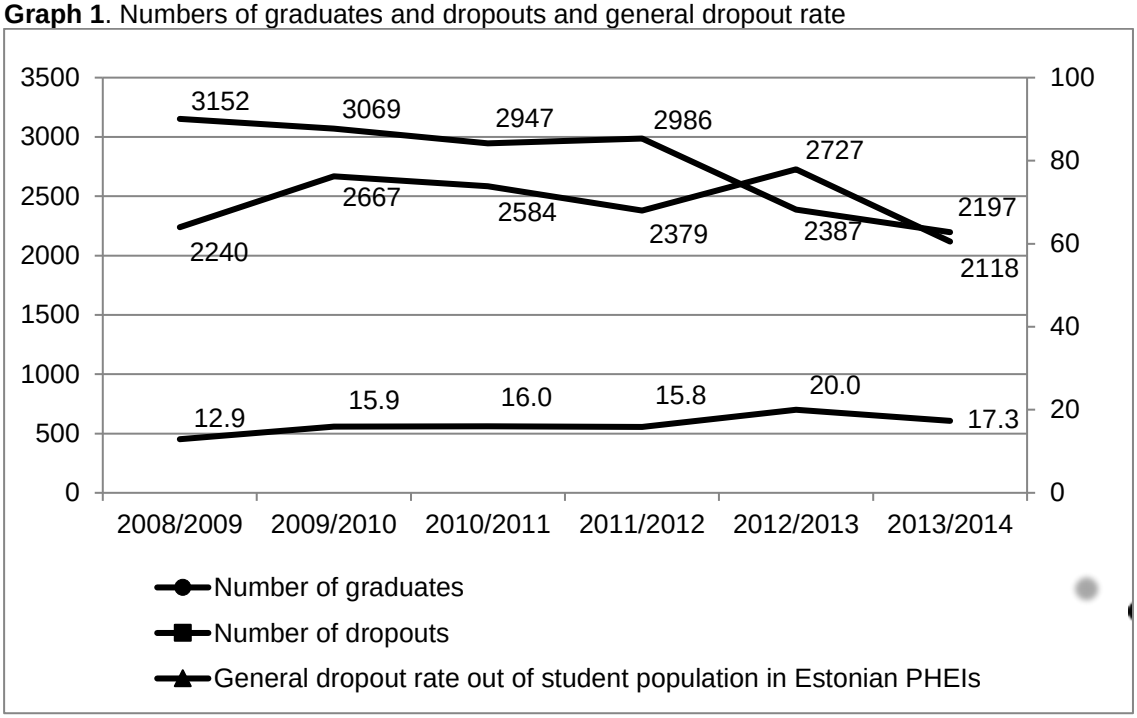
Type of organization	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2008 vs 2013
State PHEIs (1)	9185	9509	9922	10 053	8871	8355	-9,0%
Private PHEIs (2)	8157	7215	6227	4958	4762	3859	-52,7%
TOTAL (3)	17 342	16 724	16 149	15 011	13 633	12 214	-29,6%
Colleges of public universities (4)	3897	4054	4305	4259	5164	4483	15%
TOTAL (3) + (4)	21 239	20 818	20 454	19 270	18 797	16 697	-21,4%

Source. HaridusSilm; the authors' calculations

This article does not cover the students of PHE studying in vocational institutions, who form 7% of student population. In addition, some PHEIs in Estonia offer master studies. In between 2008–2013, the number of master students in PHEIs has risen from 107 to 330, but this group is also not covered by the scope of the current article.

Not only the number of students and the changes in student numbers are considered important, but also the four-year graduation rate, which is also a priority for the state and one of the indicators for state financing of the PHEIs. In between 2008–2013, the dropout rate in PHEIs has risen, while the number of graduates has fallen (Graph 1). The general dropout rate in Estonian higher education system has been between 14–17%, and there are no big differences between PHEIs and universities.

Graph 1. Numbers of graduates and dropouts and general dropout rate



Source. *HaridusSilm*; the authors' calculations

The main reasons behind the high dropout rate are: 1) traditionally high dropout rate in technical areas due to academic failure, 2) wrong choice of specialty, which is illustrated by changing the field of studies or choosing another HEI soon after being accepted in HEI, and 3) working during studies.

The final report of Estonian higher education graduates of 2012 (Laan et al., 2015) shows that after two years of graduation 82% have a job and the unemployment rate is around 2%. According to the levels of higher education, the highest employment rate is among PHE graduates – 88%, among bachelor studies graduates, this rate is 74%. The PHEI graduates (77%) also find that their curricula had enough practical training in working environments. The graduates of other levels agreed with this statement far less – for example, only 31% of

bachelor studies graduates agreed. It may be concluded that in general, practical training gives the needed work experience and overview of the future profession.

One of the state priorities in higher education is increasing international mobility, which derives from the European Union (EU) and European Higher Education Area (EHEA) purpose to ensure that 20% of student population has acquired an experience of international mobility by 2020. According to the specifics of PHEIs, it may be difficult to enhance internationalization, in case of a curricula or a study field, for example, in European level, is not on the same education level or has a considerably different study programme. It may be said that the curricula regulated by the EU directives have a certain advantage, as unified study programmes make it easier to implement international mobility.

The lower number of international students at PHEIs results from the PHEIs being less attractive than the universities. PHEIs usually provide education on specific fields and they have a certain output and demand for Estonian labour market. Therefore, there has been a lack of motivation for finding additional resources to create international study programmes. In outgoing mobility, one of the most common problems is to find compatible PHEIs, so that subjects could be transferred, and, in addition, that international studies could be integrated into the study programme.

As the average age of students is rising, and the number of high school graduates is decreasing, the PHEIs have to consider the needs and possibilities of adult learners in international mobility. The PHEIs have to analyse thoroughly, with what kind of means and how international mobility, both among students and staff, could be increased.

Research, Development and Creative Activities

The role and principles of RDC activities in PHEIs are still in the process of development. The scope and goals of RDC activities in PHEIs have, so far, been quite different, as the financing model of PHEIs has been based on the indicators of study process. The state financing of RDC activities has been almost inexistent, and RDC activities have depended much on the interest of enterprises in special fields, and the practical needs for research.

The description of RDC activities in Estonian PHEIs is described in Table 2. It must be noted that every PHEI has a right to widen the scope of the activities according to their specific nature. The principles of RDC activities also include innovation.

Table 2. The description of RDC activities in Estonian PHEIs

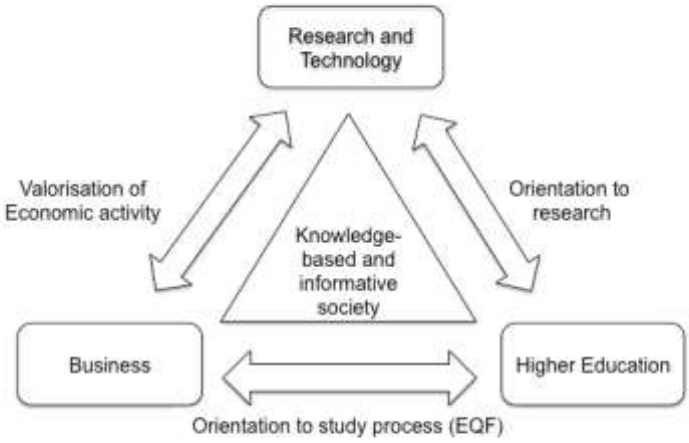
Concept	Explanation (common framework)
Research activities	• Professional research and studies producing publications complying with ETIS (Estonian Research Portal) classificatory. • Research and studies that have been ordered by SMEs or have been conducted to achieve the goal of the PHEI and as a result of which a publication or research report is completed, which complies to the criteria of research like originality, objectivity, use of evidence, accessibility, and compliance to technical-methodological criteria. • Student work resulting in a publication or a work complying to research criteria.
Development activities	• Activities ordered from outside the PHEI resulting in a report. • Activities resulting from internal need or from the development activities of study process, the result of which is a report, a study or a solution. E.g. developing new study programmes, but not the further development of a study programme. • Student research, ordered by PHEI or an enterprise, the result of which is a student report or academic work.
Creative activities	• Creative activities of public use, e.g. exhibitions, original creative work, participating in competitions, festivals, fairs; exposing creative work in a public space. • Intellectual creative work resulting in a patent or a utility model certificate.

RDC activities can, depending on their level of commercialization, be grouped into offer-focused, the so-called target funded research. In Estonian context, the PHEIs are not involved

in target-funded research, except some activities under the umbrella of science organizations. The challenge for Estonian PHEIs is to contribute to the demand-based or privately financed research, which can be ordered by companies. No common criteria has so far been created for assessing the RDC activities of PHEIs – how to measure research, whether to prefer financial, qualification-oriented indicators, or bibliometric, technometric (e.g. utility models), or sociometric indicators (Deen & Vossensteyn, 2006).

Taking into account the general trends of educational reforms in the European countries, the Agenda for the Modernisation of Europe's Higher Education Systems (European Commission, 2011) also stresses the importance of strengthening the "knowledge triangle" (Graph 2) between education, research and business activities.

Graph 2. Knowledge triangle



Source. E. Lend, European Institute of Innovation & Technology (EIT) 2012. Annual conference materials

The recommendations of the European Institute of Innovation & Technology (2012, pp 24) also focus on the better integration of higher education outcomes and the knowledge triangle, the more efficient cooperation between HEIs and enterprises, and the widening of the scope of research and development activities towards entrepreneurship, so that the topics of research could be more connected to companies. The main challenge of PHEIs is to engage in entrepreneur-focused research, so to say demand-based research, which helps to modernize the PHEIs, the regional entrepreneurs and other public and private organizations.

3.2. Main Results of Qualitative Research

The purpose of conducting interviews with higher education experts from various countries (Annex A) was to gather information, which would help to understand the reasons behind the development of PHEIs, draw parallels to the situation in Estonia and predict possible developments. The short summaries of the interviews in three different areas have been presented in Annex C. The following section brings out the core messages collected from the interviews.

Higher Education System and the Role of Professional Higher Education Institutions in It

One of the main characteristics of the European system of higher education is diversity. In many countries with a successful and flexible economy the binary higher education system has been implemented (the Netherlands, Belgium, Finland, Austria, Switzerland). The difference is made between the outputs of academic higher education of global nature and PHE targeted to regional labour markets. Similar model has been implemented in Lithuania, Poland and Estonia.

The results of interviews with international experts demonstrate that the reasons of diversity come straight from the actual needs and expectations of the society, economy and research. For example, when planning the network of PHEIs and defining learning outcomes,

the regional needs of the countries' economies (Finland, Belgium), the expectations of enterprises (Austria, Switzerland), or the factors enhancing integration (the Netherlands) were focused on.

The roles of academic and PHEIs have been developed, they comply with society's expectations and change when the context requires them to. In the countries that participated in the study, the relation of academic and PHE has been turned in the favour of PHE; in many countries (e.g. in the Netherlands and Belgium), 2/3 of the whole student population is in PHE. When studying the financing systems of different countries, it turned out that in general, higher education is financed centrally by the state, in some countries (Switzerland, Austria), private investors have been engaged as well.

Similar principles can be noted in the organization of PHE in Estonia. The differences result mainly in two factors: 1) the legal environment enables to offer PHE programmes also in the colleges of universities and in vocational institutions, and 2) the demographic situation and the long-lasting trend of the decreasing number of secondary education students have also hindered the growth of students in HEIs.

The Profile of Professional Higher Education Institutions

The volume of the PHE study programmes of the countries analysed in this research is between 120–270 ECTS credit points, the practical training forms at least 15% of the curriculum, in some cases, up to 40% of the curriculum. Most graduates of PHEIs enter the labour market. For example, in Finland and in Switzerland this figure is 80–90%, in Austria 87%. In some countries, master's studies are conducted in PHEIs, the volume of which is 60–120 ECTS depending on the programme passed before the master studies (the Netherlands, Estonia). In general, vocational studies are not conducted in PHEIs; the exceptions are Finland and Estonia.

Thanks to the close cooperation of PHEIs and employers, the process of curriculum development is rather flexible, and the learning outcomes comply with the expectations of the enterprises and support the high employment rate of graduates. Also, the representatives from companies are often engaged as academic staff or trainee supervisors. The close cooperation of PHEIs and enterprises is also being supported by the development of in-service trainings and the growing importance of applied research.

In assessing the qualification of academic staff, professional experience is valued, at the same time, the share of academic staff with PhD degrees is growing (the Netherlands, Austria, Switzerland). To achieve this, cooperation is being done with academic universities, as in general, PHEIs do not offer PhD level studies. Practically all the above mentioned principles are also characteristic to the PHE in Estonia – close relations with enterprises both in the development process of study programmes, and in the high figures of employment.

Development Trends of Professional Higher Education Institutions

Historically PHEIs used to be smaller vocational technical schools with relatively low number of students and concise study programmes. Now PHEIs have become large, multidisciplinary education establishments, illustrated well by the examples of Switzerland, Austria, Finland and the Netherlands. There are various reasons behind the emergence of multidisciplinary education institutions. In some cases, PHEIs have merged or are beginning to merge, be the reasons the regional consolidation (Switzerland) or the shrinking of school network in the conditions of decreasing demographics (Finland, Lithuania, Poland).

The number of state PHEIs established in Estonia in the beginning of 1990s has been relatively stable (8–10), while the number of private PHEIs has had larger fluctuations (7–17). In the last few years the total number of PHEIs have stabilized, most likely resulting from the reason that this number has reached its optimal (15). Another factor that has certainly helped to regulate the situation in Estonian PHE landscape was the quality assessment of 2009–2012, when the compliance of study programmes to legislation and their sustainability were assessed.

The PHEIs that were focused on full-time studies in the beginning, have widened their scope also to in-service trainings and RDC activities (the Netherlands, Switzerland, Austria). The purpose of RDC activities is to improve the quality of studies, develop the staff of the institution and to enhance knowledge society. In the countries that participated in the study, applied research is also financed by the state (this varies greatly, from 20 to 80%), which has motivated the PHEIs to increase the volume of RDC activities gradually.

Although the PHEIs are oriented to the needs of either regional or national labour market, more attention is now being paid on internationalization, which corresponds to the expectations of a more globalized economy and the wish of employers to hire workers with international experience.

4. Conclusions

In Estonia, the transformation to binary higher education system started in the beginning of the 1990s. Today the Estonian PHEIs have gone through a considerable qualitative and quantitative change and have become valued cooperation partners both to national and international institutions. In addition to their main task – to produce highly skilled specialists for the state and the employers – the task of PHEIs is now also the strengthening of competitiveness and sustainability of higher education both nationally and internationally. In this sense, the study programmes of higher education have gone through an important change of approach: more and more learning outcomes aspire to be in line with the expectations of the world of work. Achieving the latter goal is especially important to the institutions of PHE, as most PHEI graduates plan to enter the labour market just after graduation. According to Teixeira (2012), the most important competitiveness factor for HEIs now is the ability to offer contemporary study programmes matching the expectations of employers, which, in essence, can be quite a challenge for HEIs.

In order to guarantee sustainability, reasonable solutions should be sought after for improving the effectiveness and quality of higher education system. Achieving a formal diversity that is not connected to the world of work cannot be the goal for HEIs, as this would lead to the general impoverishment of HEIs, states Neave (2000).

According the analysis of the key performance indicators of Estonian HEIs in 2008–2013, the number of students has decreased (on average by 21%), the reasons of which are mainly connected to the demographic trends of Estonia; however, the state PHEIs who have close connections to employers, have managed to preserve the number of students and guarantee the high employment rate of graduates.

The development of Estonian PHEIs has many common traits with the developments that have taken place in the successful European countries (e.g. Austria, Switzerland, Finland, the Netherlands). The model of binary education system was not invented in academic institutions, it's emergence is related to the needs of society, economy and research. The role of PHEIs has developed hand in hand with the expectations of enterprises. However, there has also been unreasonable development trends, the most common of which is an aspiration to become similar to academic institutions. The authors of the article lean on Birnbaum's (1983) statement that institutional diversity in a higher education system is a normative value in case it corresponds to the needs of the labour market, to the expectations of stakeholders, and if it increases the effectiveness of the HEIs.

The results of the interviews show that the changes taken place in the higher education system in the last decade are similar in many European countries (the Netherlands, Finland, Belgium, Austria). These changes result from the need to improve the efficiency of higher education system as a whole, potential decrease in the number of students and the increasing role of lifelong learning, due to which HEIs are more prone to deal with the analysis of cost-effectiveness of study programmes. In addition to full time PHE studies, the volumes of in-service trainings, participation in applied research and in technology transfer are being increased, and the PHEIs are working together with state in order to find financial instruments needed for the above changes. Based on the data collected from interviews and the data analysis of the PHEIs, the volume of RDC activities at PHEIs forms 15–20% of the total budget. Another important motivator is the additional financing offered by the state in case a HEI is capable of earning income through RDC activities.

In Estonia, the common factors in the development of PHEIs have been the academic development of staff, developing the infrastructure of the institutions and the more efficient use of resources. The financing possibilities of the European Structural Funds have been used successfully and the cooperation between other PHEIs and academic universities has been improved. Today the institutions of PHE have specialized by professional fields and have successfully connected their field of education to the employers; the PHEIs plan their activities according to the needs of employers and the development trends of the higher education area of the EU. The development goals for the upcoming years are improving the integration of study process and applied research, increasing international mobility of students and staff, and adapting to the needs of lifelong learning.

One of the most ambitious goals of the current article was to prognosticate the changes in the Estonian PHE landscape until 2020. Comparing the development of our PHEIs to the developments in other European countries, we can also see the pressure to improve the effectiveness of financing in Estonia. In order to balance direct costs related to the quality improvement of study process, solutions have to be found to lower the relatively small general costs of PHEIs.

Therefore, the authors think the likely scenario for PHEIs would be moving towards tighter integration and increased cooperation, like forming a federation. The strengths of a federation would be more flexible possibilities for regional cooperation, curriculum development

and RDC activities, and also a more cost-efficient organization of supportive activities. At the same time, a federation would enable to preserve the autonomy of the PHE sector, the independent development of specialties and the important connection to the employers.

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References

Birnbaum, R. (1983). *Maintaining Diversity in Higher Education*. San Francisco: Jossey-Bass.

Camilleri, A. F., Delplace, S., Frankowicz, M., Hudak, R. & Tannhäuser A.-C. (2014). *Professional Higher Education in Europe. Characteristics, Practice Examples and National Differences.* Accessed by: http://www.eurashe.eu/library/mission-phe/PHE_in_Europe_Oct2014.pdf.

Clark, B. R. (1998). *Creating Entrepreneurial Universities: Organizational Pathways of Transformation.* Oxford: Pergamon Press.

Deen, J. & Vossensteyn, H. (2006). *Measuring performance of applied R&D*. Accessed by: http://www.utwente.nl/bms/cheps/publications/publications%202006/engreport06measuringperformance.pdf.

European Commission (2011). *Supporting growth and jobs – An Agenda for the Modernisation of Europe's Higher Education Systems*. Accessed by: http://ec.europa.eu/education/library/policy/modernisation_en.pdf.

European Institute of Innovation & Technology (2012). *Catalysing Innovation in the Knowledge Triangle.* Accessed by: http://www.h2020.cz/cs/storage/542688cca22219950b587b334b036ad072792ee4?uid=542688cca22219950b587b334b036ad072792ee4.

FUAS Strategy 2011–2015 (2011). Accessed by: http://www.fuas.fi/fuas/Raportit/Documents/fuas_strategia_2011_2015.pdf.

Fumasoli, T. & Lepori, B. (2011). Patterns of strategies in Swiss higher education institutions. *Higher Education*, 61(2).

Gurin, P., Dey, E. L., Hurtado, S. & Gurin, G. (2002). Diversity and Higher Education: Theory and Impact on Educational Outcomes. *Harvard Educational Review*, 72(3).

HaridusSilm (2015). Accessed by: http://www.haridussilm.ee.

Huisman, J. (1995). *Differentiation, diversity and dependency in higher education: a theoretical and empirical Analysis*. Utrecht: Lemma.

Huisman, J. (1998). Differentiation and diversity in higher education: A theoretical and Empirical analysis. In: Smart, C. (Ed.): *Handbook of Theory and Research, Vol. 13*, pp. 75–110. New York: Agathon Press.

*Institutions of Professional Higher Education Act (*RT I 1998, 61, 980). Accessed by: https://www.riigiteataja.ee/en/eli/ee/Riigikogu/act/525062015008/consolide.

Laan, M., Kuusk, A., Sunts, H. & Urb, J. (2015). *The Survey of 2012 Higher Education Graduates. Final Report.* Tartu: Ministry of Education and Research. Accessed by: https://www.hm.ee/sites/default/files/2012._a_vilistlaste_uuring.pdf.

Lend, E. (2012, 8 November). *Rakenduskõrgharidus aastatel 1992–2012 ja tulevikus* [Professional Higher Education in 1992–2012 and in the Future]. *Postimees*, pp 1.

Lukas, M. & Tamm, J. (2012, 4 May). *Kõrgharidus muutub kõikjal maailmas rakenduslikumaks* [Higher Education is Changing More Professional in Most Parts of the World]. *Õpetajate Leht*,

pp 7.

Machado, M-L., Ferreira, J. B., Santiago, R. & Taylor, J. S. (2008). *Reframing the non-university sector in Europe: Convergence or diversity?* 245-260. In: Taylor, J. S., Ferreira, J. B., Machado, M-L. & Santiago, R. (2008). *Non-University Higher Education in Europe.*

National Reform Programme "Estonia 2020" (2014). Accessed by: https://riigikantselei.ee/sites/default/files/riigikantselei/strateegiaburoo/eesti2020/estonia_2020_nrp2014_en.pdf.

National Strategy for Higher Education to 2030 (2011). Accessed by: http://www.hea.ie/sites/default/files/national_strategy_for_higher_education_2030.pdf.

Neave, G. (2000). Diversity, differentiation and the market: the debate we never had but which we ought to have done. *Higher Education Policy,Vol. 13*, 7–21.

Official Journal of the European Union (2012). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions "Rethinking Education: Investing in skills for better socio-economic outcomes"* COM(2012) 669 final. Accessed by: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012DC0669&from=EN.

Rajangu, V. (1993). *Rakenduslikud kõrgkoolid Eestis* [Professional Higher Education Institutions in Estonia]. *Pro.* Tallinn: Ministry of Culture and Education of the Estonian Republic.

Reichert, S. (2009). Institutional Diversity in European Higher Education. Tensions and challenges for policy makers and institutional leaders.

Report of the National Audit Office (2013). *Management of educational investments 10/3/2013*. Accessed by: http://www.riigikontroll.ee/tabid/206/Audit/2299/Area/1/language/en-US/Default.aspx.

Rhoades, G. (1990). Political competition and differentiation in higher education. Alexander, J. C. & Colony, P. (eds.) Differentiation Theory and Social Change: comparative and historical perspectives, pp. 187–221, New York: Columbia University Press.

Teixeira, P., Rocha, V., Biscaia, R. & Fonseca, M. (2012). Competition and diversity in higher education: an empirical approach to specialization patterns of Portuguese institutions. *Higher Education,* 63.

The Employers' Manifesto 2011–2015 (2010). Accessed by: http://www.tooandjad.ee/images/pdf/employers%20manifesto%202011-2015.pdf.

Trow, M. (1979). Elite and Mass Higher Education: American Models and European Realities. *Research into Higher Education: Processes and Structures.* Stockholm: National Board of Universities and Colleges.

Valk, A. (Toim). (2008). *Bologna protsess Eestis 2004–2008* [The Bologna Process in Estonia 2004–2008]. Tallinn: SA Archimedes.

van Vught, F. (2008). Mission diversity and reputation in higher education, *Higher Education Policy* 21, 154,155.

Witte, J. (2006). *Change of degrees and degrees of change. Comparing adaptations of European higher education systems in the context of the Bologna Process*. CHEPS/UT. Accessed by: http://www.utwente.nl/mb/cheps/phdportal/cheps%20alumni%20and%20their%20theses/2006wittedissertation.pdf.

Annex A. Experts interviewed

1. Ms. Geri Bonhof, PhD, the Rector of Utrecht University of Applied Sciences; adviser Mr. Hans Hoving, the Netherlands;
2. Mr. Thomas Bachofner, PhD, the Secretary General of the Rectors' Conference of the Swiss Universities of Applied Sciences, Switzerland;
3. Mr. Timo Luopajärvi, PhD, the CEO of the Rectors' Conference of Finnish Universities of Applied Sciences; Ms. Riitta Konkola, PhD, the President of Metropolia University of Applied Sciences, Finland;
4. Ms. Magda Kirsch, PhD, Bologna expert and Educonsult partner, Belgium;
5. Mr. Kurt Koleznik, Secretary General of the Association of Austrian Universities of Applied Sciences; adviser Ms. Heidi Esca-Scheuringer, Austria;
6. Mr. Gintautas Bražiunas, PhD, the Rector of Vilnius University of Applied Sciences; Ms. Rita Liepuoniene, the Head of Academic Affairs of Vilnius UAS; Ms. Jolanta Prediene, the Head of International Relations of Vilnius UAS, Lithuania;
7. Prof. Emeritus Jadwiga Mirecka from the Jagiellonian University Medical College; Ms. Justyna M. Bugaj, the Director of the Institute of Economics and Management, Poland;
8. Ms. Maiki Udam, PhD, the Development Director of the Estonian Quality Agency for Higher and Vocational Education; Prof. Mati Heidmets, the Head of Education Innovation Centre of Tallinn University, Estonia.

Annex B. **The Structure of the Interview**

The purpose of the interviews was to generalize the main development trends of PHEIs in the context of higher education system as a whole, and to understand the reasons behind the planned changes. The authors' goal was to find out what are the most important changes planned in PHE in terms of learning outcomes, teaching methods and the numbers of PHEIs and students for the period 2020+:

1. The development of higher education system and the role of university of applied sciences (UAS)

According to the binary higher education model, what is the general opinion in your country about the sustainability of the current higher education system?

a) Can it be assumed that in the future, the differences between UAS and universities will lessen and that both types of HEIs will become more similar? Which are the critical decision factors of one or another trend?

b) Is the binary higher education system sustainable from the viewpoint of educational politics or is it rather the wish of universities? Please describe the background of one or another opinion.

c) As it is known, in the last 20 years, what has been seen as the strength of UAS, is their closer links to labour market, this has been the main differentiating factor from traditional bachelor education. What are the expectations of enterprises in your country concerning the necessity/unnecessary of binary education system? How do you take into account the labour force needs from enterprises when planning admission?

d) Please describe the attitudes of the main societal (target) groups concerning UAS and universities? Can different attitudes be noticed concerning UAS and universities? Please name them!

2. The profile of current and future UAS

a) Do UAS in your country also offer short cycle education (EQF 4, 5) and master's level (EQF 7 level) curricula? Which are the reasons for the necessity/unnecessary of these curricula?

b) The bachelor studies at universities (EQF 6) consist of 180 ECTS CP and professional bachelor 180–240 ECTS CP. What is the share of practical training in both curricula? How big are the share of bachelor and UAS graduates who enter the labour market and the share of those who will continue their studies? Is there a plan to establish a longer bachelor study?

c) What is the percentage share of student places at academic universities and UAS? Is there a rational cause behind this kind of share?

d) When analysing the readiness of UAS and university graduates to apply their knowledge in labour market, which are the most important strengths and weaknesses of both target groups? Can you bring out areas that have an advantage at UAS? Which are the main future development trends of bachelor and applied higher education study (learning outcomes, share of graduates, etc.)

e) What is the share of practical training in UAS curricula (according to ECTS CP), and does it differ area-wise (technology, medicine, business, etc.)?

f) Which are (if any) the main differences between the qualifications of UAS and university teaching staff?

3. Institutional development trends of UAS

a) Traditionally, the UAS have been smaller and more specialized area-wise. At the same time, there has been the trend of UAS consolidation, forming consortiums, etc. Why it is being done in your opinion – are larger UAS more successful or is it rather a political decision?

b) It has been claimed that in large UAS (more than 8000 students), the management is not flexible anymore, the activities not effective enough, lecturers and students are becoming distant from each other, bureaucracy is growing, etc. Nevertheless, this trend continues. What are the reasons for this? Will UAS become smaller again in the future?

c) The collaboration of universities and UAS – will it increase or stay at the same level? Is there a danger of parallel R&D infrastructures emerging in universities and UAS, and are they going to be expensive to manage? Is the converging of universities and UAS noticeable in your country, and to what extent: is the study process of university becoming more applied and is R&D share growing at UAS?

d) In the last decades, UAS have invested in R&D activities in order to support study process through this. How should R&D be financed? Is there a danger that adding R&D activities will change UAS more theoretical, they will lose their profile and become more like traditional universities? Is the diversifying going to continue or not?

e) In order to be successful in the years 2020+, what should UAS do in the upcoming years, in your opinion: please name 3–5 most important development directions and targeted actions.

Annex C

Table 1. Summary of the interview: the Netherlands

Questions to Experts		
Higher education system as a whole. What is the role of PHEIs in higher education system? Binary model of higher education.	*What is the profile of PHEIs at the moment and in the future?*	*What are the institutional development trends of PHEIs? (name 3–5 most important ones)*
1. The system of higher education is binary, study programmes are oriented to research in universities and PHEIs have professional higher education study programmes. Study programmes have clear differences and their different outcomes will also be there in the future.	1. In general, the study programmes of PHE consist of 240 ECTS credit points, the volume of master programmes is 60–120 ECTS credit points. The graduates of PHEIs can continue their studies on master level after two years of work experience.	1. Historically, the PHEIs in the Netherlands were small, consisting of ca 400 students. Today the size of PHEIs have grown considerably, to 20 000–30 000 students.
2. The necessity of binary higher education is the result of the needs of economy and research, the criticism about the system of some HEIs is secondary.	2. No vocational training is offered in PHEIs, this kind of training is offered in vocational schools. There are no EQF level 5 study programmes in PHEI, no future prognosis can be done.	2. Multidimensional HEIs dominate, e.g. in Utrecht, the following study programmes are offered: engineering and technology, journalism, economics, biotechnology and chemistry, health care, sociology and law.
3. Academic education and research develop rather in depth, the goal in PHE is to increase interdisciplinary development and cooperation.	3. When choosing academic staff for PHEIs, experience of working in enterprise is taken into account.	3. The support of RDC activities to the study process of PHE is twofold: financial and non-financial. The bond with enterprises is considered very important.
4. The roles of academic and PHEIs have been clearly established and correspond to the expectations of society, 68% of student population is studying in PHEIs and 32% in academic universities.	4. The share of practical training in the study process is ca 15%. Students are involved in applied research and other projects.	4. Academic universities and PHEIs have close cooperation on many levels. For academic universities, this kind of cooperation is rather a way to find added value and this does not mean that research is moving outside universities.
Most relevant developments for PHEIs	*1. Improving the qualification of academic staff (For 2020, 100% of teaching staff has a master´s degree; the number of teachers with PhD is growing);* *2. Increasing the turnover from RDC activities in the total budget of PHEI (e.g. in Utrecht UAS: 2002 – 0%, 2012 – 12%, 2020 – 20%);* *3. Cooperation with enterprises to support regional development and innovation;* *4. National and international cooperation.*	

Table 2. Summary of the interview: Switzerland

1. The sustainability of the binary education system is not only an object of higher education policy, but derives directly from the development needs of society and economy.	1. PHEIs offer study programmes on two levels, PhD studies are and will be the realm of universities.	1. From the viewpoints of regional development, enterprises and employment market, the management of a PHEI and the integration of its activities to society enables a more hands-on approach.
2. Both universities and PHEIs have their own profiles, sometimes the	2. The main purpose of financing RDC activities is the improvement of the	2. The student numbers of universities and PHEIs are ca 50:50. In 2011, the PHEIs

question arises whether PHEIs are too similar to universities.	competitiveness of enterprises together with HEIs. In Switzerland, the development projects of enterprises are financed if a HEI has been included.	were very successful for the first time – more student candidates applied for PHEIs than to universities.
3. PHEIs do not offer EQF level 5 education, this is the realm of vocational education. PHEIs offer EQF level 6 and 7 education. This is due to the financing principles of vocational and higher education in Switzerland.	3. The unified system of financing RDC activities in PHEIs has not been established. Today there are two options: federal funding, which is more oriented to basic research and CTI funds for applied research.	3. In some areas, PHEIs and universities are competitors, in some areas, cooperation partners. For example, ETEA Institute in Zürich (biomass studies) was founded together with the universities.
4. The political vision of PHE– ca 80% should enter the working life and 20% should continue their studies on master's level. There are no obstacles fir entering bachelor level studies in universities.	4. The main role of PHEIs has been and will be specialized professional training.	
Most relevant developments for PHEIs	*1. The binary system has justified itself, the main role of PHEIs is to prepare specialists for the labour market;* *2. The financing of RDC activities has been insufficient, new financing instruments are being created;* *3. Regional cooperation with enterprises and other PHEIs, and also with universities.*	

Table 3. Summary of the interview: Finland

1. The policy makers support the binary model. According to legislation, the universities and PHEIs are autonomous institutions. Starting from 2015, the PHEIs will be financed by the state (not by regional governments any more).	1. Since 2005, master studies can be conducted in PHEIs, the applicants to master programmes have to have 3 years of work experience. Some PHEIs also offer vocational studies, but EQF level 5 study programmes are not favoured.	1. The current network of PHEIs is too large – there are 25 PHEIs, many of which have smaller sub-units. With universities, the situation is similar. The number of PHEIs is decreasing, most likely it will shrink to 20.
2. Cooperation between PHEIs and universities could be improved by the shared use of teaching staff and infrastructure. The PHEIs must, no doubt, preserve and strengthen their profile.	2. The PHEI profile will preserve. The share of practical training is 30–75 ECTS credit points, the employment rate 80–90%. In the future, the main focus in PHEIs will be on master studies. The admission rate of universities and PHEIs will be 50:50.	2. PHEIs will be merged in Northern Finland, new integration models may emerge. There are no agreed limits of the student population, but the notional low is 2500 students.
3. The needs of regional development are taken into account when planning the restructuring of the higher education network. Both types of HEIs, PHEIs and universities, are considered necessary.	3. Regarding the change in the financing model of higher education, there have been discussions about the shortening of full-time PHE studies, but professional unions are against this idea. The shared problem of the whole higher education sector is low efficiency.	3. The merging of universities and PHEIs would be politically inacceptable, however, both sectors need some reorganization.

4. The learning outcomes must correspond to the expectations of employers (number of graduates and their competences). In RDC activities, the trend is to focus on research questions derived from enterprises.	4. The mapping of RDC infrastructure is planned, higher efficiency both in teaching and research is expected from universities, PHEIs must contribute more to applied research.	4. It is considered necessary to reach an agreement of which study programmes should be taught in PHEIs and which ones in universities.
Most relevant developments for PHEIs	*1. Strengthening of the core competences and profile of PHEIs, shrinking of education network;* *2. Focusing of PHEI activities onto regional development;* *3. Decreasing the number of parallel study programmes, efficient use of infrastructure;* *4. Developing academic staff;* *5. Lowering the dropout rates.*	

Table 4. Summary of the interview: Belgium

1. Flanders (Belgium) considers the binary model to be sustainable, the main focus is on the opinion of employers – both PHEI and university graduates are needed in the labour market. The graduates of bachelor programmes mainly continue in master's studies, the graduates of PHEIs enter the labour market.	1. In the past, PHEIs used to have both professional higher education and master programmes. As a result of the current reform, master level studies have been integrated into the programmes of the universities. It is possible to implement EQF level 5 programmes, but this has not been done yet, as adult training centres have this kind of programmes and they are not financed in PHEIs.	1. In 1995, the process of merging monodisciplinary PHEIs and creating larger interdisciplinary PHEIs started in Belgium. More than 200 PHEIs have merged into 21 institutions.
2. Since 2013/2014, former colleges have become PHE-type institutions and the associations of the so-called "old universities". This was the result of Flanders region supporting the modern knowledge society. The influence and the market share of the "old universities" has decreased.	2. The volume of bachelor and PHE programmes is 180 ECTS credit points, the amount of practical training in PHEIs is 10–40%, there is no plan to either shorten or lengthen the amount of practical training.	2. As a result of integration, both the PHEIs and universities are now the members of the association, using their own infrastructures each.
3. The academic community makes a difference between PHEIs and universities, so does the labour market. Employees with both profiles are needed.	3. 60% from the total number of students are studying at PHEIs, 40% at universities. The future trend is 50:50.	3. 10 years ago, the establishing of learning-outcome-based study programmes was started, in universities, this process started a few years ago. The focuses differ by the type of institution.
Most relevant developments for PHEIs	*1. To define the learning outcomes together with enterprises. However, the correlation of learning outcomes and the suggestions of enterprises does not have to be too strong;* *2. To focus on applied research, which will enhance the quality of studies and the development of knowledge based society;* *3. The process of institutional reorganization is ongoing, the cooperation of PHEIs must be strengthened both nationally, in the EU and in the global context.*	

Table 5. Summary of the interview: Austria

1. The higher education system is clearly binary, the profiles of both PHEIs and universities have been established and are in balance. PHEIs were founded in Austria 20 years ago, at the moment, there are 21 PHEIs in Austria with 403 study programmes, including 184 master programmes.	1. In PHEIs, EQF level 6 and 7 are offered, there is no plan to implement short-cycle studies.	1. No major changes hare being planned in the PHEI network. The largest PHEIs have about 4500 students, the smallest have about ca 500 students. Possible merging apply to universities mostly.
2. Admission target groups 9% come from vocational institutions, 73% from secondary schools and 11% from foreign countries.	2. The primary stakeholder of PHEIs has been and will be the labour market. 6 months after graduation, 87% of students have found their first job and their average salary is 2466 € (18% higher than in the average of higher education graduates).	2. The possibilities of state financing of RDC activities has been discussed, at the moment, the financing is project-based and there is no agreed model of financing.
3. About 15% of total student population is in PHE. Unlike in universities, the number of state financed student places in PHEIs is limited. The share of PHEI graduates in the higher education sector is 30% of the total number of graduates.	3. The share of practical training has been ca 1 semester, there is no plan to change this.	3. Internationalization and the supporting activities of internationalization are being considered important, for example, the graduates of international master degrees get a residence and work permit in Austria.
4. The politicians aim for a closer cooperation between universities and PHEIs.	4. The planned learning outcomes are achieved by curriculum development and the quality of teaching staff – 80% of teaching staff has work experience in the industry.	
Most relevant developments for PHEIs	*1. According to the prognosis of experts, the share of PHEI in the education market will increase – the relation between university and PHEI admission will be 40:60;* *2. The coherence of the higher education subjects must be improved, at the moment, there are too many limits within the system;* *3. In PHEIs, it is important to guarantee the flexibility and constant renewing of study programmes, in order to be able to react to the changes in the labour market adequately;* *4. It is important to establish the base financing of RDC activities, keeping in mind the principles of co-financing from the state and private sector.*	

Table 6. Summary of the interview: Lithuania

1. The binary education system has been implemented. The overall number of students is decreasing and this will put a pressure to the situation.	1. At the moment, there are 30 state PHEIs and 10 private PHEIs in Lithuania, 14 public and 5 private universities. The smaller PHEIs have 800–900 students.	1. The first wave of merging PHEIs is over, the next steps depend on the number of students and on the sustainability of PHEIs. Probably there will be more merging, but the integration with universities has been finished.
2. At the moment, there are about 130 000 students in	2. The objectivity of ranking HEIs is questionable. The	2. Reorganizing is needed in setting the qualification

Lithuanian PHEIs, the market share of professional higher education is 40%.	most problematic area is private higher education.	requirements for academic staff, for example, the professor of PHEI is required to supervise PhD students. Due to this requirement, professors prefer to work at universities.
3. Unpopular fields in Lithuania are agriculture and teacher training, the number of art students has also fallen.	3. The profile of PHEIs is defined by study programmes and study process. The connection with enterprises is very strong.	3. The question of RDC financing in PHEIs must be resolved, at the moment, all PHEIs in Lithuania get ca 2 million litas (600 000 €) for RDC, the rest has to be earned by HEIs themselves.
4. PHEIs are focused on the labour market, the share of practical training is 30 ECTS credit points (in universities, it is 50% less). Before starting working at a PHEI, the teacher has to have 3 years of work experience in the industry, ca 12% of teaching staff has a PhD or equivalent qualification.	4. In the future, the sustainability of PHEIs depend on the quality of studies. It is well known that many young people from Lithuania choose to enter the labour market abroad.	4. Vocational education and EQF level 5 education do not match with the profile of PHEIs in Lithuania.
Most relevant developments for PHEIs	*1. The binary higher education model has been developed, the balance between study areas has changed recently;* *2. The number of students in higher education is falling, therefore the government is reorganizing the financing model of higher education. In some PHEIs, the student population has decreased by ca 50%. The number of study programmes is also being scrutinized. At the moment, the financing principle of "student basket" is applied, PHEI gets 5000 litas and the universities 8000 litas per student.* *3. The modernization of higher education system is necessary, but it is very complex, because the decisions about universities are done by the Parliament, about PHEIs, by the government. The changes resulting from the decreasing number of students cannot be avoided.*	

Table 7. Summary of the interview: Poland

1. Since 2007./2008, the higher education system of Poland has three study levels: bachelor (Licencjat, inżynier), master and PhD. This system applies to most fields, except law, pharmacy, psychology, veterinary studies, medical and dentistry studies.	1. The PHEIs were separated from universities in 1997, to strengthen regional development and consider the needs of enterprises. The Polish higher education system has been very flexible and institutions have been able to focus on their individual interests.	1. The number of students is decreasing rapidly, it brings along the decrease in the number of HEIs. It is thought that mainly the number of private HEIs will fall, as they will not be able to fulfil the quality requirements.
2. In Polish higher education, binary education models dominate, but the lines between *uniwersytet*, *politechnika* and *academia* are not very clear. For example, the graduates of polytechnics (*politechika)* will have the title engineer *(inżynier*).	2. A certain balance has emerged in PHE and bachelor programmes, the competition is reasonable and relevant. At the same time, some universities also offer PHE programmes.	2. About the modernization of the higher education system – quality assessments will change a few things here. Three factors that will change the HEIs in the future will be the decreasing number of students, financing, and the quality of teaching and research.
3. The main problem in the higher education sector in	3. One of the main characteristics of PHEI study	3. RDC activities in PHEIs – only the teaching process is

Poland is the high number of HEIs – 427 (a few years ago, it was even 470), of which only 130 are state financed.	programmes is the larger volume of practical training (3–4 months), and the requirement for academic staff to have enterprise experience before starting their career in the PHEI.	centrally financed, additional funds must be found by the PHEI, which is mainly done via research. Regional financing is marginal. Costs for RDC form 30–40% of overall turnover.
Most relevant developments for PHEIs	*1. Quality requirements, decreasing number of students and financing of higher education are the factors that will influence HEIs the most in the future. The total number of HEIs will definitely fall, a 30% fall may be predicted (some HEIs will finish their activities, some will merge);* *2. The role of PHEIs is and will be supporting of regional higher education and development;* *3. The universities will focus on the development of research. PHEIs also conduct research, but it will not be the main focus of PHEIs;* *4. HEIs will value their graduates´´ ability to enter the working life quickly after graduation. In Krakow, 72% of graduates will find a job in 6 months after graduation.*	

Table 8. Summary of the interview: Estonia

1. The binary higher education model has worked well so far and it corresponds to the needs of society.	1. The PHEIs in Estonia mostly offer EQF level 6 education, but also vocational education. This integrated model has been working so far and different EQF levels should be offered in PHEIs the future as well, as Estonia is such a small country.	1. When our goal is to give satisfactory education to the population of Estonia, we need no changes. If we wish to mean something to the world, we should build at least one knowledge centre that would bring together the best students and teachers.
2. The area of higher education has been reorganized. No added value would come from merging the PHEIs with universities.	2. Integration of different disciplines would be advisable (creating interdisciplinary PHEIs).	2. The quality of academic staff and the constant development of academic staff is considered very important.
3. The overall student body has decreased.	3. PHEIs have different interpretations of RDC activities. The state demands active RDC involvement, but there is no direct financing of RDC from the state.	3. In Estonia, the driving forces are competition, doing things differently, finding one's own niche. The quality is important, the best ones will survive.
4. A sustainable PHEI has at least 1000 students and a good infrastructure, otherwise it is not possible to guarantee quality.		4. Bilingual studies have to be introduced in master's level at least. A smaller country like Estonia must make more efforts.
5. PHEIs have become confident, and the cooperation between PHEIs is very good.		5. Constant modernization of study programmes.
Most relevant developments for PHEIs	*1. Binary higher education system has been established and it is functioning;* *2.The landscape of higher education has been reorganized;* *3. Integration/cooperation in many areas;* *4. Problems with RDC activities – the focus has to be defined and the question of base financing has to be solved;* *5. The quality and sustainability of teaching staff has to be improved;* *6. PHEIs have to find their own niche and promote their activities on a larger scale;* *7. Possibilities for studying in more than language have to be created.*	