Structure and content of environmental education in Estonian higer education

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The Concept

- The concept of environmental education was first formulated by William Stapp, professor at the University of Michigan in the first issue of *„Journal of Environmental Education"*:

  „Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution" (Stapp et al., 1969, 30-31).

- On a national level environmental education was first acknowledged as an influential component of education in President Richard Nixon's message to the Congress in 1970

  (Nixon, R.M. 1970. President's Message to the Congress of the United States. In Environment Quality, the First Annual Report of the Council on Environmental Quality, together with the President's Message to Congress. Washington D.C.: U.S. Government Printing Office, S/N 0-38, 110. ED 062-109, p. 11.)

- and the same year the Environmental Quality Education Act was passed

  (The Environmental Quality Education Act - Public Law 91-516).

- Problems of environmental education were internationally recognised at the United Nations Convention on the Human Environment, held in Stockholm in 1972.

“The Belgrade Charter”

- In 1975, the recommendation of Stockholm conference was discussed at the international workshop in Belgrade, where UNESCO proposed “The Belgrade Charter: A Global Framework for Environmental Education” defining the aims of environmental education, including to develop the awareness of the population and draw their attention to environment .....”

International Environmental Education Programme

- In 1975 UNESCO and the United Nations Environmental Programme (UNEP) established the International Environmental Education Programme (IEEP).
- The UNESCO-UNEP Congress on Environmental Education and Training was held in Moscow in 1987 and thereafter the document entitled "International Strategy for Action in the Field of Environmental Education and Training" was published

- It was stressed already in the final report of the Tbilisi Conference in 1977 (Final Report, Tbilisi Conference, 1977, 33) that universities as centres for research and training of qualified personnel must further environmental education and train experts in formal and non-formal education.

National strategies for environmental education, UNESCO

- In 1980 UNESCO published a document with the aim of initiating a discussion on national strategies for environmental education claiming, for instance, that while planning and sustaining the national strategy, the local environmental priorities and educational experiences must be considered.

(Suggestions for Developing a National Strategy for Environmental Education – A Planning and Management Process. 1980. UNESCO, ED-80/WS/135),

"Our Common Future"

- After the publication of the Report of World Commission "Our Common Future" in 1987 indicating the necessity for global sustainable development, environmental education came to be primarily associated with the new approach.

(World Commission on Sustainable Development. Our Common Future. 1987. Oxford University Press),

United Nations Conference on Environment and Development

- The concept of sustainable development became the primary concern for the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 and the basis for the Agenda 21 and the respective regional orientation documents.

United Nations Decade of Education for Sustainable Development

- The resolution 57/254 "United Nations Decade of Education for Sustainable Development 2005-2014" adopted by the UN General Assembly in December 2002 stresses that „…*education is an indispensable element for achieving sustainable development*"
- (*UN General Assembly Resolution A/RES/57/254 of 21 February 2003*).

Environmental education in Scandinavia

- The discussion of environmental education in Scandinavia was initiated by the meetings in Stockholm (1983), Oslo (1985), and Helsinki (1987). Environmental education as an integral part of both general and university education was rapidly implemented in the Scandinavian countries

(How to Develop Environmental Education. 1986. Environment 87 Working Group, Helsinki).

Environmental protection was first discussed in Estonian education system

- Environmental protection was first discussed in Estonian education system in mid-1980s when it was primarily regarded as a part of learning natural sciences.
- A somewhat different approach – interdisciplinary environmental topics – was suggested by T. Tenno and
- A. Tõldsepp (1986).

(Tenno, T., Tõldsepp, A. 1986. Keskkonnakaitse küsimused õppeainetevaheliste seostena. Tallinn, Valgus.)

ENVIRONMENTAL EDUCATION CONCEPT FOR THE REPUBLIC OF ESTONIA

Tartu, Tallinn, 2006

"By signing agreements concerning human development and environmental protection and by joining the European Union, Estonia has taken on several international obligations in the field of sustainable development and education. Estonia participates in the implementation of the UN Decade for Education for Sustainable Development (2005–2014) and the Convention on Biological Diversity, both of which include drawing up national documents supporting the promotion of environmental education and awareness."

Environmental specialists working in environmental

- According to the data of the Ministry of Environment (http://www.envir.ee/378516), out of the 643 environmental specialists working in environmental institutions altogether 529 have a university degree, i.e., the share of university graduates is 82%.

A need for 360 additional specialists with a university degree.

- In 2-3 years' time there will be a need for 360 additional specialists with a university degree.
- Specialisations needed in addition to the existing ones: ambient air, environmental technologies, geoinformatics, environmental supervision, planning, environmental impact assessment, waste handling, water economy, air quality specialists, hunting, environmental economics, radiation protection, noise measurement.

Problems:

- Problems: the knowledge of administrative measures and state authorities is very poor;
- the professional expertise is far too theoretical;
- the knowledge of laws and the ability to read laws is practically nonexistent (no knowledge of state databases);
- there is no synergy between research and the state needs;
- there is no institution training environmental inspectors;
- the level of teaching geoinformatic systems must be improved;
- trainees of the 3+2 system cannot position themselves professionally after only 3 years of training (water, air, waste etc);
- students should have their apprenticeship in local governments, industrial and agricultural companies.

The Bigger Players in the Field

- **Estonian University of Life Sciences**
- Field of study: environmental protection, the use and protection of natural resources; nature tourism, environmental economics.
- **University of Tartu**
- **Ecology and biota protection**. Aims (Bachelor studies): extended knowledge of ecology and biodiversity protection; firm foundation for further studies on Master's level; basis for the teacher training in natural sciences or biology.
- Aims (Master's studies): academic specialisation in ecology and biodiversity protection; specialisation on the Master's level in three fields of activity: land ecology; aquatic ecology; biodiversity protection.

- **Tallinn University of Technology**
- Master's (3+2) studies curriculum "Chemical and Environmental Technology".
- Aims of the curriculum: to provide knowledge in chemical and environmental protection technology and fuel technology; provide skills in designing chemical and environmental technological processes, and choosing the optimal technological sketch maps and devices.

- **Tallinn University**
- The studies of **Environmental Management** give a balanced foundation in both natural and social sciences (e.g. in economics, business management, legislation). The speciality subjects include numerous innovative disciplines, for instance, ecotoxicology, environmental economics, assessment of environmental impact, introduction to waste management.
- The **Geoecology** curriculum gives the basic knowledge and practical skills needed for handling environment-related problems.

- **Eurouniversity**
- The Bachelor and Master programmes of the **Environmental Conservation** curriculum are interdisciplinary – knowledge is provided in natural sciences, legislation and economic processes. In addition to the EU environmental policy and environmental law, environmental management, assessment of environmental damage and ecological security, also modern IT software employed in environmental studies is introduced.

- **Tallinn University of Applied Sciences**
- The aims of the applied curriculum of **Techno-ecology** include the following:
- to form a comprehensive worldview in terms of natural sciences (with reference to the speciality);
- to comprehend the essence of chemical, physical, biological and ecological processes, their relevance in choosing and developing waste management technologies;
- to comprehend the Estonian and EU legislation related to the speciality field (Waste Act, Environmental Law, Agrarian Law etc);
- to enhance the knowledge in engineering graphics and environmental planning.

- **Türi College, University of Tartu** (professional higher education):
- Provides an extensive basic professional education with the subjects dealing with both indoor and outdoor environment. The curriculum includes, for instance, subject modules in biology, technology and law. Special attention is paid to the comprehension of Estonian and EU legislation. The training also focuses on the necessary skills for working at a local government, managing a company, and drawing and managing projects.

- **Estonian Maritime Academy**
- **Hydrometeorology and environment protection** – professional higher education with the specialisation in hydrometeorology and environment protection.

Altogether 40 environmental protection BA programmes and 91 MA curricula

- Altogether 40 environmental protection BA programmes and 91 MA curricula were collected from the Estonian higher education database and university websites. (At present the higher education curriculum register includes 39 curricula related directly to environmental protection as environmental science or services, 2008.)
- The present analysis also includes curricula that comprised modules or single subjects related to environmental issues.
- According to the EU classification the environmental protection curricula are divided into two: environmental science and services. In the present survey the given division was not followed.

The total number of various academic subjects > 1400

- The total number of various academic subjects taught at the universities amounted to over 1400. As there was no possibility to analyse the content of the subjects, the subjects with thematic similarities were categorised into 45 subject groups.
- In further analysis, the capacity of an academic subject was measured by the number of credit points. According to the current regulation one credit point corresponds to 40 hours of studies performed by the student in mastering the given subject.
- One Estonian credit point corresponds to 1.5 ECTS units of the European Credit Transfer System.

Data Processing

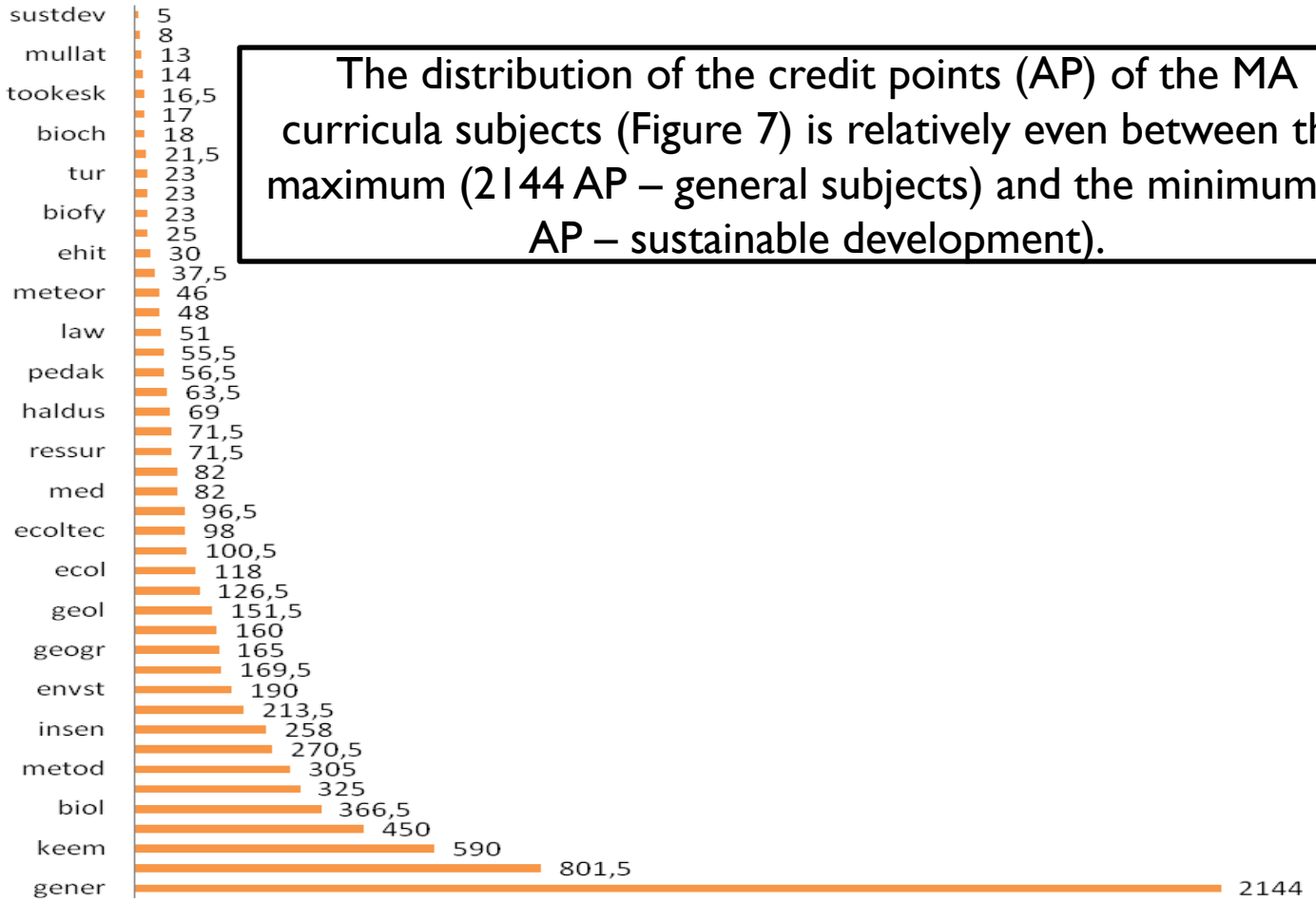
- **Cluster Analysis.** The subject groups and the respective credit points of the environmental protection curricula were gathered in a single database which formed the basis for the cluster analysis. In conducting the cluster analysis the software PC-ORD (McCune, Mefford, 1999) was employed.
- In the course of the analysis the subject groups of the curricula were used as reference material and the respective credit points as variables.

- **Principal Component Analysis, PCA.** Principal Component Analysis enables the comparison of various characteristics in a factor space in order to determine the variability of characteristics on different axes (McCune, Mefford, 1999; McCune, Grace, Urban, 2002).

Master Curricula

- The distribution of the credit points (AP) of the MA curricula subjects is relatively even between the maximum (2144 AP – general subjects) and the minimum (5 AP – sustainable development).
- The largest volume of work is included in the general subjects that form a quarter of the total subject volume in the MA curricula.
- In comparison there is considerably less practice (801.5 AP), and instruction in chemistry (590 AP) and physics (450 AP). A list of subject groups representing an average 1 AP per curriculum is relatively long – 27 (volume AP<100).

ÕPPEAINERÜHMADE JAOTUS AINEPUNKTIDE ALUSEL KESKKONNAKAITSE MAGISTRIÕPPE ÕPPEKAVADES



The distribution of the credit points (AP) of the MA curricula subjects (Figure 7) is relatively even between the maximum (2144 AP – general subjects) and the minimum (5 AP – sustainable development).

- Thus, it may be concluded that half of the subject groups in environmental protection MA programmes are specific to the subject and the curricula provide more specific specialisation than the BA curricula:
- introduction to sustainable development, landscape design, soil science, maritime studies, working environment, biochemistry, biodiversity, tourism, protection of the Baltic Sea, biophysics, introduction to the European Union, building construction, landscape studies, meteorology, language course for specific purposes, basics of law, hydrology, pedagogy, architecture, public administration, mathematics, natural resources, statistics, medicine, dendrology, ecotechnology.

Cluster analysis of the subject groups of MA curricula

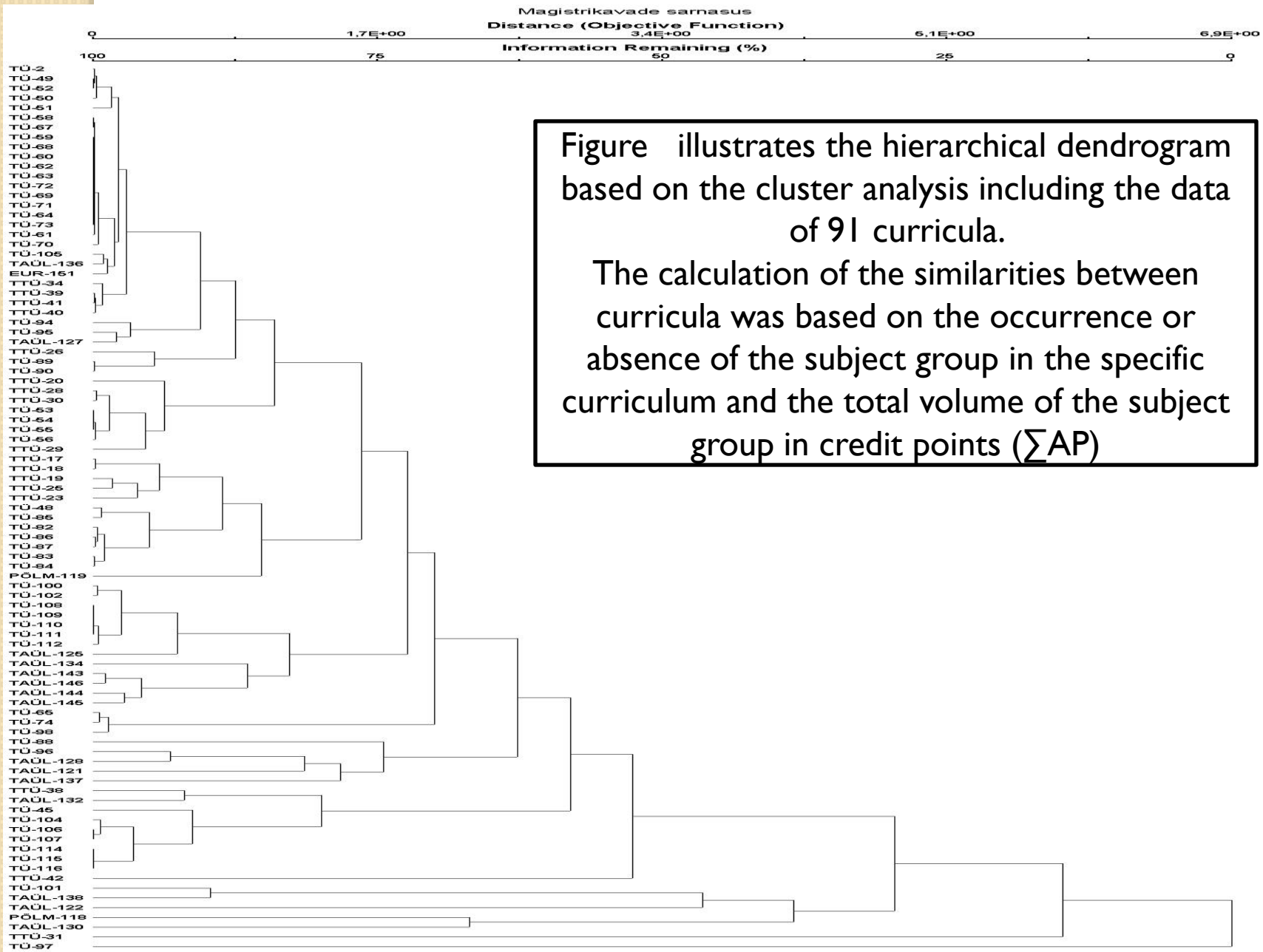
- The cluster analysis was conducted with regards to the subject groups of the curricula and the volume of the academic subjects in the specific curricula. While assessing the similarities between the curricula, Euclidean distance was employed.

- Figure illustrates the hierarchical dendrogram based on the results of the cluster analysis of the MA curricula subject groups.
- In case the cluster separation criterion is taken as 75%, four clusters could be separated from the sample.

- The first cluster includes the following subject groups: informatics, genetics, molecular biology, biochemistry, biophysics, medicine.
- The second cluster comprises the subject groups public administration, introduction to the European Union, geography, landscape studies, environmental management, environmental status, natural resources, meteorology, protection of the Baltic Sea and soil science.
- The third cluster includes: biology, ecology, statistics, physics, chemistry, practice, general subjects, methodology, seminars, agriculture and mathematics.
- The fourth cluster comprises the following subject groups: building construction, language course for specific purposes, ecotechnology, engineering, introduction to economics, basics of law, geology, hydrology and pedagogy

Cluster analysis of the environmental protection MA curricula

- Figure illustrates the hierarchical dendrogram based on the cluster analysis including the data of 91 curricula. The calculation of the similarities between curricula was based on the occurrence or absence of the subject group in the specific curriculum and the total volume of the subject group in credit points (∑AP). The similarities between the curricula were calculated using Euclidean distance, Ward's method was employed in the clustering process.
- The description of the clusters was based on the criterion of 70% similarity which complies with the higher education standard requirements for differences between curricula.



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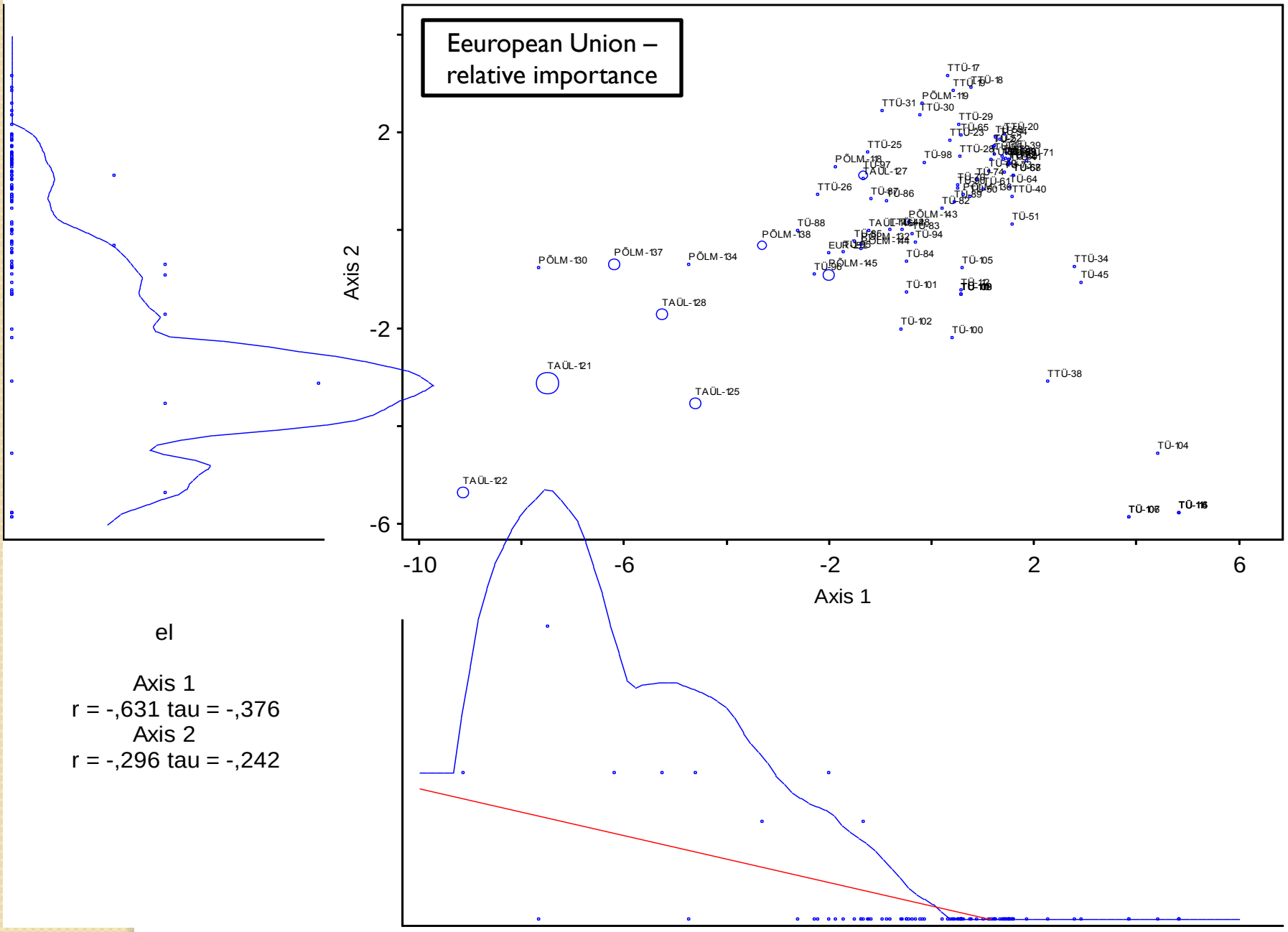
Principal component analysis (PCA) of the environmental protection MA curricula

- Most of the curricula are positioned in the factor space as a dense point cloud so that only several curricula remain separate from the cloud.

MAGISTRIKAVAD, PCA



el

Axis 1
r = -,631 tau = -,376
Axis 2
r = -,296 tau = -,242

Results

- The analysis of the components to follow, i.e., considering the relative importance of various subject groups in the curriculum structure enables us to find differences between relatively similar curricula.
- The analysis demonstrates similarities and differences between environmental curricula implemented in different higher education establishments in Estonia.
- It seems to be highly important to compare the structure and content of different level curricula between universities of the region.