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Sustainable University: Beyond the Third Mission

Jurgis Kazimieras Staniškis
Kaunas University of Technology, Institute of Environmental Engineering
K. Donelaičio str. 20-311, LT-44239 Kaunas, Lithuania

Corresponding author: Jurgis.staniskis@ktu.lt
J. K. Staniškis, Kaunas University of Technology, Institute of Environmental Engineering
K. Donelaičio str. 20-311, LT-44239 Kaunas, Lithuania

Higher education, especially nowadays, is subject to endless discussions and substantial reforms of performance management in universities across the world. The roots of the modern university go back 1,000 years to the University of Paris, where the unique aim was education and training. This was the first mission realised in the context of the Catholic Church. The way and the form of the modern university development throughout history has always been influenced by social triggers. The trigger for the second mission of research was Humboldt who led to the establishment of the University of Berlin in 1810 (Trencher et al., 2014). The major catalyst of the third mission and the university role of technology transfer was the emergence of an independent relationship between science, industrial innovation and government policy leading to the so-called 'knowledge-based' economy. With the new mission, managerialism entered the university with performance management as its integral part. Traditionally, performance management in universities has had a development role, i.e. helping individuals to improve their (future) performance. However, the new system is more judgemental, i.e. seeking to qualitatively evaluate (past) performance. There is a danger that the new system could inhibit creativity and anxiety about how the systems are used (Bogt and Scapens, 2012). Yet, the emergence of global entrepreneurial approach is not the last step in the ever-evolving modern university. There are many good examples, where co-creative partnership for sustainability is implemented, which is fundamentally different from conventional third mission activities.

The paper analyses the way in which new performance systems are applied and their results and presents a case of co-creation for sustainability at the Institute of Environmental Engineering (APINI) at Kaunas University of Technology (KTU). It shows that the missions of education, research and technology transfer are able to potentially co-exist with co-creation for sustainability and complement the first three missions at a sustainable university.

Introduction

The third mission for universities has emerged since 1980s as a result of global pressure on universities to play a more important role in knowledge economy. This meant the birth of the entrepreneurial university seeking to align creative powers of academia with economic development. This shift in focus from society to economy was promoted by Organization for Economic Cooperation and Development (OECD) in particular with the intention to focus discussions concerning the third mission and societal contributions to technology and innovation transfer activities, including patenting, licensing and creation of spin-off firms and technology parks.

In such an approach, the entrepreneurial university is seen as an engine of economic growth with both government and academic pro-entrepreneurial discourses driven by success stories, such as the high-tech driven economic prosperity supposedly attained by linkages between Silicon Valley and Stanford. What is often forgotten is that emergence of the entrepreneurial model with active university-industry partnership and technology commercialisation is a phenomenon occurring in few universities, particularly in the USA (Etzkowitz, 2003), although it has been framed and promoted around the globe (Trencher et al., 2014).

In order to capture the contemporary innovation process, a Triple Helix methodological tool has been developed, where the focus on the recursive overlay of communications among universities, industries and governments allows for the organisation of research questions in relation to various models and metaphors (Leydesdorf and Etzkowitz, 1998).

'I think there is a poison in education all across Europe which is anti-industry and anti- entrepreneurship', says Dr. Jos Peeters, managing director of Capricorn Venture Partners (ERT, 1998). 'A profound reform of education systems in Europe is needed. Greater emphasis must be placed on entrepreneurship at all levels of education. Despite the pressing need to manage better the transition from school to work, school-industry cooperation is still underdeveloped in Europe' (ERT, 1998).

Some studies have examined the contributions made by European universities to technological development in industry from the viewpoint of the recipient firm. However, a very small proactive role has been made by universities to increase the process of technology transfer from academia to local business or to regional economic development (Jones-Evans and Klofsten, 1998). One of the problems is the European research council being run by scientists for the benefit of science on its own. While this system of self-governance has been quite successful in the past, it fails to deliver goods in terms of the contribution from the science system to the development of industry. EU science policy can be seen as an example of science-industry-government interaction at work. EU programmes tend to be designed, managed and implemented by administrators. It is only in the review and appraisal of proposals that scientists are involved (Diunen, 1998).

To push toward research and commercialisation in the United States, in Europe, and in Japan acquire greater force, because governments constantly try to cut their contribution to university budgets and require them to supplement them by their own earnings from research, whether through knowledge transfer, spin-offs, or equity in start-ups. According to the World Bank research, in this case, public universities are gaining more autonomy and freedom, which opens opportunities for a more aggressive pursuit of reforms to attract better students, reorganise and expand research and development (R&D), explore new sources of financing, and better understand entrepreneurship (Yusuf, 2007).

The World Bank investigation also shows that in Japan companies prefer informal ties with universities. Corporate researchers co-author papers with university faculty members, spend time working at university labs, do joint projects with university researchers, and enter into consulting arrangements with university-based researchers. At the other extreme is the United States, where university-industry relationship covers the entire spectrum, and formal contracted arrangements with universities are common. Europe falls somewhere in the middle. In the Republic of Korea and India, small firms have virtually no contact with universities as far as research is concerned, but they may seek help for the purpose of trouble-shooting from individual researchers. A similar tendency is materialising in China as a

result of a determined push by governments to induce both universities and state enterprises to cooperate in developing technologies (Yusuf, 2007).

The same World Bank publication argues that in pro-entrepreneurial approach there is no substantial evidence proving that the narrow economic focus of the third mission and rise in conventional university-industry links have had any 'discernible' negative impacts on universities. However, such positive appraisals ignore an array of concerns voiced against the rise of the third mission regime. For example, in the collection (Caanan and Shuman, 2008), there is a general concern about the neglect of humanities at the expense of the revenue-generating fields of applied sciences. Here, Rajani Naidoo provides a grim look on the role of education in the developing world. She argues that the penetration of neoliberal policies within developing countries will not only worsen quality, purpose, and functionality of higher education in these regions, but also has little potential to contribute to development goals, which may be capable of eroding current disparities between high- and low-income countries. There is still an unanswered question how neoliberalism affects the working and personal lives, especially of other staff within higher education, such as student affairs personnel, administrative staff, custodial workers, and librarians (Shakjahan, 2012). A detailed study of Finnish academics has tried at least partially to answer these questions. They conclude that 'the ethos of what it means to be academic is at stake, as a new competitive ethos is challenging the traditional collegial academic ethos. It directs those who do academic work to pursue goals that are rewarded by performance management measures and metrics, even if scholars themselves do not agree with the rationale and usefulness of these indicators' (Kallio et al., 2015). Benjamin Ginsburg in his book The *Fall of the Faculty* argues that 'the problem lies in the explosive growth in administration in US universities and the concomitant decline in faculty power in influence. Put simply, 'deanlets' – administrators without doctorates or serious academic training – rule the roost, and professors do not have nearly as much institutional power as they used to' (Ginsburg, 2011).

As it has been mentioned above, from 1980s globalisation and neoliberalism have put increasingly strong pressures on universities to behave like a business. In order to enable universities to meet these challenges, reformers started to integrate universities, tighten the links between different parts of organisation in order to make them more efficient, manageable and accountable. Although universities are still predominantly public in most countries, the way in which authorities run them has changed fundamentally, and this has been heavily influenced by notions 'academic capitalism' and 'entrepreneurial universities'. Such public managerialistic regimes are driven by university-state alliances, political-administrative interests and semi-competitive logic based on incentive policies where public support depends partly on teaching and/or research performance.

In such a context, the relevance of the prevailing entrepreneurial model to achieving desirable human development needs in universities to be examined in a more detailed way.

Co-creation for sustainability – beyond the third mission

There are several studies on performance management or results-based management and its implications on employees' motivation and creativity at universities. Below, some results of two studies are presented:

Study on performance management implications for work motivation in Finnish universities (Kallio et al., 2015; Kallio and Kallio, 2014); and *Study on the effects of the transition to more quantitative performance management system in Groningen and Manchester universities* (Bogt and Scapens, 2016).

The study in 5 Finnish universities was based on a survey questionnaire in order to gather opinions of employees related to performance management in respective universities. A sample consisting of 966 persons (response rate – 33.6%) represents well the 3 universities and their 12 faculties and, with some caution, could be generalised as of Finnish university employees in general. The study results showed that universities surveyed did not succeed in developing their performance management activities, since only 15% of the

respondents were satisfied with the system, 40% expressed their dissatisfaction and a similar percentage took a neutral view. What is very surprising is that with regard to monetary compensation given by nation-wide performance-related pay, numerous respondents reported that the performance management system had no effect. An explanation for this could be that numerous respondents reported that universities did not have additional financial resources necessary to reward good performance and described the system as 'a fraud' or 'meaningless'.

Moreover, negative side effects of the business model based on performance management seem obvious: more than 70% of the respondents thought that their university was more interested in quantity than quality, and almost 80% agreed with the statement 'Nowadays in universities the content of the work is secondary; what is important is to produce as much as possible' (Kallio and Kallio, 2014).

The second part of the research was to investigate how the proliferation of performance management could be seen as a catalyst for changing the very ethos of what it is to be an academic and to do academic work. The conclusion is that the performance management system significantly increases bureaucracy and at the same time does not remove subjectivity in measurement but relocates it at a greater distance from the measured subject. Survey respondents see the adoption of performance management as a violation of academic freedom and of the traditional collegial values of university. At the same time, some scholars in the sample clearly embrace the performance management system and the competition it encourages and see themselves as entrepreneurs rather than as members of academic communities and are self-contained and engaged in their own personal development.

The general conclusion is 'that ethos of what it means to be an academic is at stake, as a new competitive ethos is challenging the traditional collegial academic ethos... A significant feature of the Finnish case is that after over a decade of more incremental change fundamental reforms are now carried out quickly and methodically, putting unprecedented pressure on scholars to reconsider their relationship to the work they do and, indeed, their academic identities. While universities in Finland have traditionally been seen in Humboldtian spirit as national cultural institutions, the new system affords them a more instrumental role and steers them towards competition with each other' (Kallio et al., 2015).

In the second study, a mixture of interviews and questionnaire surveys were employed to explore how internal changes affected the work of academics and how they perceived the effects of performance management currently in use at Groningen and Manchester universities, accounting and finance departments. Most of the interviewees and questionnaire respondents in both universities confirmed that research output increased in the recent years, but they were uncertain whether the quality of the research increased and about the effects on teaching. The way in which the new performance management systems are applied not only puts pressure on academics to meet the performance standards, but they also seem to increase levels of anxiety and stress. A number of people indicated that the promotion criteria were not clear and that they liked their jobs less than previously.

An important conclusion is that 'the claims that the new (judgemental) performance measurement systems in universities increases transparency and objectivity are debatable... The subjectivities in the previous (developmental) systems were usually located within academic departments where individuals subjected to them worked and were applied by professors who worked closely with those individuals. But now the subjectivities in the (more judgemental) systems are located at the Faculty of Business school level and applied by distant administrators – who are either not academics or. If they are academics, are from different disciplines' (Bogt and Scapens, 2012).

Studies like those mentioned above and others show that universities are now actively controlled as production companies by visible top managers who have considerable discretionary power. This has led to a new cadre of professional managers and to managerialism that is central to performance management. Although, universities are somehow involved in production, the nature or essence of what they produce can be expressed metaphorically; from this, it follows that it is difficult to evaluate such an enigmatic product, and equally difficult to optimise its production, the technology of which is

far from clear. Such a type of investigations could be summarised by Nobel laureate Philip Sharp words that 'as universities become more identified with commercial wealth, they also lose their uniqueness in society. They are no longer viewed as ivory towers of intellectual pursuits and truthful thoughts, but rather enterprises driven by arrogant individuals out to capture as much money and influence as possible' (Bogt and Scapens, 2012; Czarniavska and Genell, 2002).

Human development needs to be critically evaluated and the need for an alternative mission and the so-called social contract between academic science and society is urgently needed. 'In contrast to the narrow economic scope of the third mission, for a variety of reasons, the function of co-creation for sustainability is far better equipped to bring about the sustainable transformation of a specific geographical area or societal sub-system... The function of co-creation for sustainability aims to address localized sustainability issues by creating socio-technical and environmental transformations with the goal of materializing sustainable development in a given geographical vicinity' (Trencher et al., 2014).

A systematic comparison of the functions of technology transfer and co-creation for sustainability reveals clear differences, which are so great that it is impossible to consider the role of co-creation for sustainability to be just as a mere offshoot or different enactment of the third mission. Besides the fact that the third mission is formulated entirely in economic terms, a clash of interest could also be expected in cost-effectiveness, commercialisation of results and short- to mid-term economic gains. Nevertheless, these two approaches could be considered as two distinctly differing but compatible missions. Below, 2 out of 39 cases are shortly presented in order to show how a university may exploit the co-creation approach to bring about the sustainable transformation of a particular geographical area or societal sub-system. The second aim is to illustrate the larger point that the function of co-creation for sustainability is in fact capable of becoming an institutional priority/mission in a very different context (Trencher et al., 2014).

The 2 cases enabling these objectives are: the 2000 Watt Society Pilot Region Basel programme by Swiss Federal Institutes of Technology (ETH) and Novatlantis, and the Oberlin Project by Oberlin College, Ohio, USA. The first case seeks to foster a city-wide transition to 2000-watt per capita society, with the wider ambition of accelerating a national de-carbonisation effort. ETH has established itself as a frontrunner transformative university where one of the priorities/missions is that of bringing about socio-technical transformations in view of realising a 2000-watt society (Marechal et al., 2005).

The Oberlin project is an alliance between the Oberlin College and the city of Oberlin. Described as a 'full spectrum sustainability' experiment, the project functions as a decentralised system of individual sustainability initiatives, where each of them contributes to the prosperity, resilience and sustainability of the larger community. There is clear potential for the frontrunner institution of the Oberlin College to leapfrog the widely promoted model of an entrepreneurial university and become a prototype of a transformative institution – one dedicated to co-creating societal transformations with a view to materialising sustainable development (Orr, 2011).

The mentioned above and other cases clearly show that universities are, therefore, being provided with a precious and growing occasion to renew their social contracts and evolve in a direction more aligned to the societal and environmental needs of contemporary human settlements.

Lithuanian case of co-creation for sustainability

Sustainable development/co-creation for sustainability poses particular challenges to engineering. In the past, engineering has applied a more 'expert' approach based upon a 'control and predict' paradigm. However, sustainability issues require the participation of various stakeholder groups that might have differing perspectives, goals and paradigms. The consideration and management of differing paradigms is, thus, a critical task in engineering for sustainable development (Gustafsson, 2013; Staniškis, 2012).

In the work field of engineers, environment is strongly connected to the usage of raw materials and energy,

their possibilities to reuse and so to reduce emissions to the environment and depletion of scarce resources. In terms of sustainability, this is not only important from the anthropocentric point of view but also from the perspective of the ecosystem (Carew, Mitchell 2008). A well-known tool is Life Cycle Assessment (LCA), which not only systematically structures the material and energy flows in the system under investigation but also is a way to evaluate consequences of decisions in development planning and implementation (Thabrew, Wiek & Ries 2009).

Based upon this analysis, some of the authors' experiences are presented to sensitise students to different paradigms and to teach practical approaches for community involvement. A combination of lectures, exercises and projects are proposed to introduce the tool of participatory modelling and to provide students with experiences in its application in stakeholder processes. In particular, the linking of group projects to on-going local stakeholder processes has proven to be a valuable approach for students to gain experience in the implementation and facilitation of meaningful stakeholder participation (Halbe et al., 2013). LCA directly focuses on resources and emissions and the possibility of recycling, which is of great value for engineers, as their designs usually involve large material and energy flows from and to the environment. Furthermore, the key aspect of sustainability is a long-term view for which building sets of scenarios are very useful. LCA and scenario building are generally applicable, irrespective of the engineering discipline, giving a good understanding of a sustainable engineering design (Jonker and Harmsen, 2013).

A new strategy of Kaunas University of Technology was approved by the Board of University in December 2011. During the development of the strategy, a solid number of meetings and discussions were held as well as a platform for discussion was provided for University community and partners.

Based on the new strategy, 5 main strategic activities were defined. All of them emphasise the issue of social responsibility and sustainable development, i.e. the University's activities are focused on human well-being and sustainable development of the state. The University formulates its objectives:

- to reorganise University's activities and cooperation with partners for the unity of economic, environmental, social and cultural objectives and values;
- to identify – together with government authorities, municipalities, industry and business – developmental issues of the city, region and country; to actively participate in implementing the strategy based on sustainable development and knowledge-based economy;
- to organise lifelong studies which promote socially and morally correct, ethically acceptable sustainable consumption and economic development of the country;
- to develop systematic education and consulting for companies, organisations and business, using the best competencies of the University;
- to develop and support within the University such activities that are responsive to the problems of sustainable development of the city, region and country and the quality of life.

Following the strategy implementation process, from 2012, all the faculties, research institutes, and central administration departments should focus their activities according to the new strategy directions and develop an annual plan of activities. The annual plans of activities of the first level structural units are discussed with the management team and approved by the Rector. Within a faculty or a research institute, deans or directors set the priorities of activities on the programme level. The educational dimension is usually promoted by both institutional and divisional level. The institutional level coordinates actions related to implementation of general courses into curriculum, while specific aspects of the programme are addressed in division and sub-division levels. The best results have been achieved at the Institute of Environmental Engineering (APINI), where the research, education and curriculum development is combined with traditional education in engineering sciences with studies in natural and social sciences and with the ultimate goal of educating scholars who are uniquely situated to undertake serious research and policy assessments to tackle sustainable development challenges. The MSc and PhD programme graduates have a unique combination of diverse skills and deep

insight into the most challenging problems of future human welfare. Together with experts from industry and governmental institutions, students in the programmes conduct research in a wide variety of areas associated with sustainable development. Students also benefit from being part of APINI research programmes and projects that focus on sustainable development. Moreover, both current students and graduates are invited to conferences and other events organised by the APINI. The most motivated students are offered employment at the APINI.

Sustainable development is one of the major topics of APINI research. The monograph *Sustainable innovations in Lithuanian industry: development and implementation*, written by APINI researchers, lists more than 60 projects in the field of sustainable development and cleaner production carried out during the last decade. New projects start nearly every year, and most of them have sustainability aspects covered. All the activities of the Institute in 2013 were evaluated by QUESTE-SI (Engineering Education – for Sustainable Industries) methodology, consisting of four dimensions, and recognised to be among the best in Europe (Staniškis and Katiliūtė, 2016).

Dimension 1: Institution. The Institute of Environmental Engineering systematically implements sustainable development and cleaner production programmes and projects in Lithuania and abroad. The staff of the Institute provide comprehensive assistance to business, society, non-governmental and governmental organisations in improvement of environmental performance for achieving a common goal, not a conflict, between economic growth and environmental protection now and in the future. Daily activities of the APINI are based on principles of sustainability. In 25 years, since the establishment, the APINI has increased the scope of activities and capacity to tackle key environmental problems and emerging scientific topics. While initial research activities of the Institute focused on environmental issues, social and economic topics have been gradually introduced into the research and education. The Institute of Environmental Engineering has been the initiator of the integration of sustainable development ideas at Kaunas University of Technology.

Extensive co-operation with foreign scientific institutions and universities has enabled the APINI to become an advanced and unique institution in Lithuania actively working in the area of sustainable development. The portfolio of 25-year experience and knowledge in the sustainability area has resulted in initiation and contribution to implementation of social responsibility strategy at Kaunas University of Technology.

The APINI sustainable development strategy is aimed at strengthening the responsibility to society and country, focusing its activities on enhancing the quality of human life and acceleration of statehood development. The principal activity thereto is to create and transfer University's contribution into country's viability and its sustainable economic, social and cultural knowledge-based development.

The mission of the Institute of Environmental Engineering is to disseminate sustainable development principles in Lithuania and all over the world through application of innovative sustainable solutions by means of interdisciplinary research, topical studies and continuous spread of knowledge and values.

The vision of the Institute of Environmental Engineering is a unique international leader in the field of sustainability based on interdisciplinary research and advanced studies (Katiliūtė and Staniškis, 2015).

The strategic objectives for the future (until 2020) are as follows:

- implementation and integration of sustainable development issues in academic society;
- improvement of staff competence and working environment;
- implementation of sustainability principles in the community or community involvement.

The strategy of sustainable development includes a requirement of annual reports on the progress of defined activities. The first sustainability report was prepared at the end of 2012.

Reports on research and education activities as well as results achieved are prepared annually by the Institute of Environmental Engineering since 1992 for the Ministry of Education and Science of the Republic of Lithuania, Research Council of Lithuania, and Kaunas University of Technology.

The Institute of Environmental Engineering could be recognised as the most successful department at KTU dealing with social responsibility issues. The Institute has knowledge and capacity to provide substantial contribution in the sustainable development process at Kaunas University of Technology acting as a source of knowledge on sustainable development.

Dimension 2: Education and curriculum development. None of the central issues related to sustainable development can be understood from the sole perspective of a traditional discipline, whether in social, natural, engineering or health sciences. The MSc and PhD programmes include a set of rigorous core requirements in engineering, social and natural sciences designed to provide a deep understanding of the interaction between all three systems, and provide students with the flexibility to pursue in-depth research in a broad variety of environmental areas. Graduates of the programmes have a unique combination of diverse skills and deep insight into the most challenging problems of future human welfare. Together with experts from industry and governmental institutions, students in the programmes conduct research in a wide variety of areas, including climate change and its social consequences, causes and solutions to extreme material and energy resources inefficiency, energy systems, water resources, waste management systems, ecosystems, corporate social responsibility, environmental economics and eco-design. Students also benefit from being part of APINI research programmes and projects that focus on sustainable development.

Many graduates pursue academic careers in interdisciplinary graduate and undergraduate programmes with the focus on industry and the environment as well as in more traditional engineering disciplines. Others choose non-academic positions in governmental institutions, non-governmental organisations or private firms engaged in environmental and sustainable development projects.

During 22 years of a PhD programme and 14 years of an MSc programme, the emphasis has been placed on research at the boundaries between social, natural and engineering sciences, and these programmes have become very popular and highly rated. Almost all PhD graduates have accepted academic positions as tenure-track professors or post-doctoral fellows, or have been employed at high-level positions in the private sector and international organisations.

This 2-year programme equips students with the knowledge and skills necessary for managing eco-development issues at different levels and provides them with opportunities to establish ties that bridge science and industry. These qualities aid graduates to formulate policies to advance sustainable development at the company, local, regional and global levels, to facilitate cooperation between industry, government and society in the design of a sustainable development and environment policy, and to generate strategies for environmental conflict management. For the MSc in engineering, students are required to:

- 'demonstrate the ability to develop and design products, processes and systems while taking into account the circumstances and needs of individuals and the targets for economically, socially and ecologically sustainable development set by the community';
- 'demonstrate insight into the possibilities and limitations of technology, its role in the society and the responsibility of the individual for how it is used, including both social and economic aspects and also environmental and occupational health and safety considerations'(Staniškis and Katili*ūtė*, 2016).

The APINI has a double strategy regarding implementation of education for sustainable development:

- to have educational programmes focusing on sustainable development, and
- to integrate sustainability in all engineering and architectural programmes (Staniškis and Arbačiauskas, 2011; Finnveden and Stromberg, 2013).

The integration of research and education activities ensures the quality and recognition of the education programme nationally and internationally, e.g. Baltic Sea Region Award, 2012 National Energy Globe award for sustainability.

The first PhD programme in Environmental Engineering and Landscape Management started in 1994. The main research and education topics of the programme initially were related to environmental technologies. Fast

development of preventive concepts and the idea of sustainability has gradually led to change of priorities, contents and structure of PhD education. Therefore, a new interdisciplinary PhD programme in Environmental Engineering (in the context of sustainable development) was launched in 2012. The programme is designed to educate researchers and university teachers in engineering, social, economic and natural science disciplines that underpin sustainable development.

The research results presented in the programme's doctoral dissertations are based on integrative, interdisciplinary research that is needed to explore science and policy issues in the area of sustainable development. Integrated assessment methods and concepts (e.g. transitions, modelling, and scenario analysis) are instrumental to provide answers to the central questions of sustainable development.

The PhD candidates have an opportunity to choose an individual-based programme from a selection of courses offered by KTU and other involved universities. For each PhD student, a tailor-made programme is designed.

Dimension 3: Students involvement. The Institute of Environmental Engineering recognises the need to provide a holistic approach to social responsibility issues for its students, including both curricular and non-curricular activities. Since the first student enrolment in the programme, the APINI has focused on involving students in project-based research activities. The APINI's research and close co-operation with industry yield knowledge, which is disseminated to students during lectures and is available in the curriculum literature. Course projects are designed to give students an internal visibility of the subject by solving SRS-related issues (particularly environmental) in industrial enterprises. The APINI staff support students' extra-curricular research activities and often contribute to student research by direct involvement and being co-authors of scientific publications (at least 11 publications have been prepared). Both current students and graduates are invited to SRS-related conferences (3 in the last 4 years) and other events organised by the APINI. The most motivated students are offered employment at the APINI (7 MSc students have been employed in total).

The APINI also aims to promote sustainability issues among students, as well as staff members, through environmental non-curricular on-campus activities. For example, the APINI initiated waste recycling campaign 'Žalieji Rūmai' (Green University Building) in 2010 and 'Žaliasis Universitetas' (Green University) in 2012. 'Žaliasis Universitetas' is the first environmental campaign to be launched for the whole campus. The APINI has participated and invited its students to participate in the biggest environmental community campaign in Lithuania 'Darom' (Let's do it) for cleaning territories from waste.

To track the information about its graduates, the APINI has established a database that enables to compile different information including graduate contacts and placement. The information is used to invite graduates to APINI organised events related to sustainability. In 2012, to mark the 10th anniversary of the MSc programme, all graduates were surveyed to gather information on the impact of the master's studies on their careers and their intellectual and personal development. Graduate reflections have been used by the teaching staff for making appropriate improvements in the MSc programme.

Dimension 4: Research, innovation and impact on the region. Sustainable development is one of the major topics of APINI research. All the APINI members do research or teach subjects related to sustainability issues. Research topics, such as environmental performance, eco-design, chemicals control, integrated waste management and others, to a great extent deal with sustainability issues.

The majority of the research projects in which APINI staff are involved are related to the sustainability issue, e.g. recently finished FP7 project CRISP had the core objective to identify potential paths – transition pathways – to enhance behavioural and societal changes towards sustainable, low carbon Europe in 2050. FP7 project VISION RD4SD aims to ensure that Europe is able to contribute to sustainable development of the world by formulating policies and decisions based on robust, up-to-date knowledge. BSR 2007-2013 project 'Reco Baltic 21 Tech', as one of its goals, strives to help regions to reach sustainable waste management. The monograph *Sustainable Innovations in Lithuanian Industry: Development and Implementation*, prepared by APINI research-

ers lists more than 80 projects in the field of sustainable development and cleaner production carried out during the last decade. New projects are started nearly every year, and most of them have sustainability aspects covered.

The APINI members have carried out a number of applied sustainability studies dealing directly or partly with sustainability issues. A substantial share of these studies has been ordered by the Ministry of Economy of the Republic of Lithuania. Some of the studies to mention are *Preparation of the Sustainable Industrial Development Programme Project*, *Situation Analysis and Proposal for the Sustainable Development of Lithuanian Industry*, etc.

Research of the members of the Institute of Environmental Engineering has received external recognition. In 2003–2005, the Institute won the 5BP (Centres of Excellence) project *Sustainable Industrial Development – Strengthening of the Competence of the Institute of Environmental Engineering* and became an EU competence centre with regard to sustainable industrial development. The Institute and its staff have received a number of awards: the National Science Award for the work on development and implementation of preventive environmental strategies in Lithuanian industry during 1993–2003; the Baltic Sea Award 2010, which goes annually for those putting research findings into practice, technical decisions or other activities that contribute substantially to the Baltic Sea and the sustainable development of the region; Dr. Valdas Adamkus Award for scientific work important for Lithuania's present and future and for active ecological activities. In 2008, in the European Parliament, the Institute received the Energy Globe 2008 National Award for *The System for Preventive Energy Saving & Waste Minimization Innovation Development and Implementation in Industry 1997–2007* (APINI-SPIN). In 2008, APINI became a winner of the industrialists' competition *Achievements in Environmental Protection* for successful international cooperation in development and implementation of the *System of Generation and Implementation of Preventive Environmental Innovations*. More than 150 participants from 18 countries were recruited for the Energy Trophy + competition 2007/2009. The APINI co-ordinated this project in Lithuania and 5 Lithuanian companies took part in the competition. The construction company *Dzūkijos statyba* managed to save 30% of the total energy consumed by management and low-cost measures. Following the decision of the jury of international climate and energy experts, this company was recognised as the third place winner. The winners were ceremonially awarded with the presentation of the Energy Trophies at the European Prize Gala held in the course of the European Sustainable Energy Week in 2009.

As it is obvious from the lists of projects and publications of the APINI, the Institute has many linkages with industry and other organisations. The APINI staff are also involved in various associations, professional or technical bodies. This co-operation allows obtaining the latest information, getting experience and knowledge, and exchanging ideas, which contributes to the research quality and allows spreading sustainable development ideas via organisation of conferences, seminars and other events, giving trainings to society and industry on sustainable consumption and production, and teaching students.

Conclusions and considerations

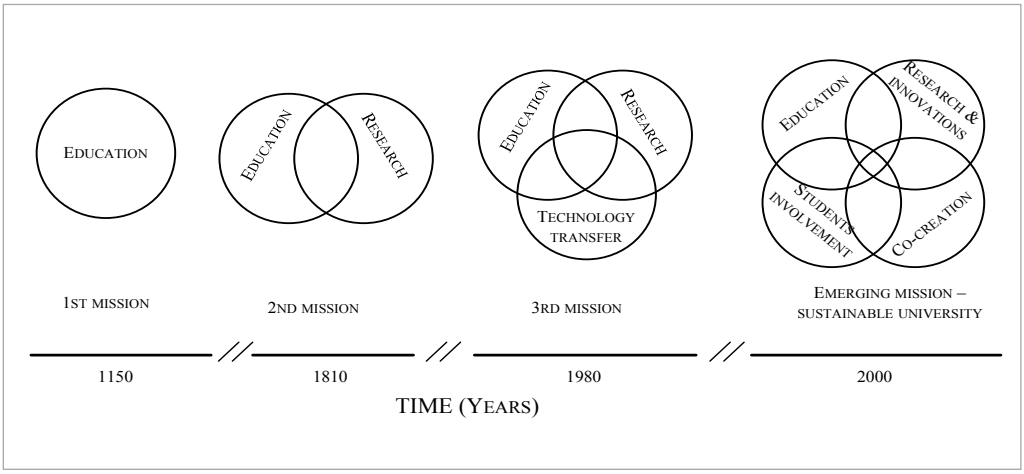
Many investigations and the empirical analysis point out a radical paradigm shift in the social functions of the academy. It is the move from the idea of 'simply contributing to economic and societal development via technology transfer to actually transforming and co-creating society in the pursuit of sustainable development via a much broader range of channels, approaches and actors' (Trencher et al., 2014).

Today, higher education is a short-term business system of delivering student examinations for a not well-defined global market. The co-creation for sustainability programmes as usual is started with great enthusiasm by a group of dedicated teachers. However, gradual funding squeeze, continuous internal reorganisations, and external political decision-making have led to the dismantling of the faculty organisation, which more or less have 'killed' an organised teacher influence. In the meantime, from the material gathered for that and our experience, there are windows of opportunity in the existing institutional and cognitive set-

tings. The success of these processes, however, is still to be seen, and a strategy remains to be conceived for scaling up the possible successes to other engineering programmes (Valderrama et al., 2013; Staniškis and Katiliūtė, 2016).

Achieving sustainable outcomes will require engineers who can engage with diverse stakeholders, employ new tools for decision support, conduct adaptive management, and find creative solutions by integrating natural, human, and manufactured systems in novel ways (Swanstrom et al., 2013). There is demand now for the services of engineers who are skilled in integrating natural, human, and manufactured systems to achieve sustainable consumption and production. That demand is likely to grow. Thus, there is likely to be a useful role for a 2-year, full-time, master's degree programme that nurtures systems-integration skills at a high level. Such a programme would draw upon existing curricula in sustainable engineering, but would probably have to break some new ground in the curriculum design (Thomson, 2013). As usual, many of the original courses have survived in the new programmes, and others have disappeared. But with the existing recruitment situation, many courses have too few students to be economically viable. However, many of the teacher staff have started to challenge the non-inclusive and more and more bureaucratic school system that hinders the development of high quality master's programmes (Garrett and Bhamara, 2013).

Fig. 1
Emergence of 4th mission – transformative / sustainable university



The question that, therefore, emerges is: 'How can government policy and incentive systems such as funding mechanisms acknowledge this and encourage university actors to pursue a much broader development agenda founded upon place-based sustainability needs?' (Trencher et al., 2014). 'Empowering **educators** must be central to any professional development initiative. Educators are important agents for change within education systems. Effective educational transformation is dependent upon educators being motivated to bring about change, as well as being capable of and supported in doing so' (Economic Commission for Europe, 2011).

The third mission of universities and co-creation for sustainability should not be viewed in isolation and emerging co-creation should not become the sole focus for a particular university. It is obvious that entrepreneurialism and technology transfer is too narrow and not much significant for many smaller and humanities-focused institutions and, at the same time, it is evident that the mission of co-creation for sustainability will not become for all the universities in the world. However, what is definitely obvious is that sustainability crisis is prompting the emergence of a new type of institutions: the transformative/sustainable university (see Fig.1).

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About author

Prof. habil. dr. JURGIS KAZIMIERAS STANIŠKIS

Director, Institute of Environmental Engineering, Kaunas University of Technology.

Main research areas: sustainable development, cleaner production, resource effciciency, environmental system theory.

Address: Gedimino St. 50, Kaunas LT-44239, Lithuania, tel. +370 37 300323, e-mail: jurgis.staniskis@ktu.lt

Darnus universitetas: anapus trečiosios misijos

Gauta:
2016 m. liepa

Priimta spaudai:
2016 m. rugsėjis

Jurgis Kazimieras Staniškis
Kauno technologijos universitetas, Aplinkos inžinerijos institutas

Nuo pat Viduramžių universitetas tradiciškai buvo suvokiamas kaip mokslininkų ir studentų bendrija, siekianti bendrų tikslų, tačiau moderniaisiais laikais šis įvaizdis sunyko, yra laikomas net kažkokios įtartinos tradicijos reliktu. Didėjantis polinkis aukštąjį mokslą plėtoti korporatyviniais pagrindais atsilieps jo reputacijai viešojoje sferoje, vaidmeniui toje gyvybinėje erdvėje, kuri skatina dėstytojus nagrinėti svarbius socialinius klausimus, kaupti žinias, išsiugdyti vertybes, pažinti idėjas, kritiškai mąstyti ir atsakingai veikti. Jei universitetas siekia išlikti, dėstytojams teks permąstyti savo kaip viešųjų intelektualų vaidmenį, susieti savo tyrimus su esminiais socialiniais klausimais, išmokti rašyti ir kalbėtis taip, kad juos išgirstų platesni visuomenės sluoksniai.

Straipsnyje apžvelgiamos visos trys universitetų vystymosi misijos ir detaliai analizuojama trečiosios misijos diegimo kontraversijos. Trečiosios misijos problemų sprendimui siūloma darnumo ko-kūrybos (co-creation for sustainability) koncepcija labiau atitinkanti tradicinį universiteto suvokimą bei kartu atsiliepianti ir į šiuolaikinio universiteto misiją. Kaip pavyzdys, pateikiama KTU Aplinkos inžinerijos instituto 25 metų veikla, labiausiai atitinkanti darnaus universiteto viziją, kuri integruoja visas tris misijas, nepažeidžiant svarbiausių universitetinių vertybių.