

22. McNay I. (2012) Leading strategic change in higher education – closing the implementation gap, *Leadership and Governance in Higher Education*, 2012/4: 49–70.
23. Neave G. (2012) *The Evaluative State, Institutional Autonomy and Re-engineering Higher Education in Western Europe*, Palgrave MacMillan, New York.
24. Oleksiyenko, A. (2014) Socio-economic forces and the rise of the world-class research university in the post-soviet higher education space: the case of Ukraine, *European Journal of Higher Education*, 4(3): 249–265.
25. Osipian, A. (2009) Corruption and reform in higher education in Ukraine, *Canadian and International Educational Journal* 38(2): 104–122.
26. Osipian A. (2014) Transforming University Governance in Ukraine: Collegiums, Bureaucracies, and Political Institutions, *Higher Education Policy*, 27: 65–84.
27. Pettigrew, A. (1979) On Studying Organizational Cultures, *Administrative Science Quarterly* 24 (4): 570–581.
28. Ramsden P. (1998) *Learning to Lead in Higher Education*, London, Routledge
29. Rummyantseva, N., Chapman, D.W., Shaw, M.A. (forthcoming) Ukrainian higher education reform through the eyes of academic staff: change, resistance and possibilities.
30. Scott P. (2015) To universities that hath shall be given, *The Guardian*, 2 June.
31. Shattock, M. (ed.) (2007) *Entrepreneurialism in Universities and the Knowledge Economy*, Maidenhead, Society for Research into Higher Education and OpenUP.
32. Silver, H. (2010) Does a University have a Culture? *Studies in Higher Education*, 28(2): 157–169.
33. Tierney, W. (1988) Organizational Culture in Higher Education: Defining the Essentials. *The Journal of Higher Education*, 59(1): 2–21.
34. Tosi, H. (1975) *Theories of Organization*. Chicago: St. Clair Press.
35. Wasser H. (1990) Changes in the European University, *Higher Education Quarterly*, 44(2): 110–122.
36. Weick K. (1976) Educational organizations as loosely coupled systems, *Administrative Science Quarterly*, 21(1).
37. Wynnycykyi, M (2014) Thoughts from Kiev – on Higher Education. <http://www.ukiedaily.com/thoughts-from-kyiv/2014/8/thoughts-kyiv-60-08-2014-higher-education/>
38. Yershova. O. and Gordiichuk, A. (2013) University autonomy in Ukraine: international experience and national interests, *American Journal of Educational Research*, 1(11) 472–476.

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THE FINANCIAL AUTONOMY OF UNIVERSITIES AND THE NATIONAL INNOVATION PERFORMANCE IN EUROPE: POSSIBLE LINKAGES IN FINLAND AND OTHER EUROPEAN COUNTRIES

In Europe the usefulness of science to society and competitiveness through innovation are very topical higher education policies. From this viewpoint, financial autonomy is seen as a powerful lever to promote competitiveness. However, we do not know much about the financial autonomy of universities or about its linkages to innovation economy. In Finland, the new frames for the financial autonomy of universities were introduced five years ago using extensive national university reform. This paper considers the levels of different dimensions of financial autonomy of universities and national input innovation performance in Finland and other European countries. In addition, this paper investigated linkages between input and output innovation performance. This trial suggests that the average level of financial autonomy yielded statistical differences between countries' input innovation performance. However, these differences existed only related to the type of public funding and the establishment of degree programmes. Moreover, two European countries – having low financial autonomy in these elements – are successful in their input innovation performance. The latest trends to act independent legal and financial entities seemed not to generate innovation success. Several countries that have high financial autonomy in some other dimensions, ranked weaker in their input innovation performance. Innovation input and output performance are strongly interrelated in Europe. However, it is research and development and linkages between innovation actors rather than higher education students or graduates that were important to countries' success in their innovation output performance.

Keywords: financial autonomy, universities, innovation performance.

Introduction. «Universities need more autonomy to better respond to their external environment» is a topical policy slogan found on governmental agendas in Finland and in most of the other European countries. This usually means emphasizing efficient performance and universities' social and economic benefits (European Commission, 2007, 2010, 2011 and 2012; OECD, 2009). Aghion et al. (2009) found that university autonomy and competition are positively correlated with university output in European countries and among public US universities. Positive linkages between autonomy and performance were also found in a few other studies (Jongbloed, 2010; Jongbloed et al., 2010; Hoareau et al., 2012). Overall, evidence of causality between university autonomy and university performance is slight thus far (Enders et al., 2013; Volkwein and Malik, 1997; Author, 2012).

In Finland, the new financial autonomy of universities was introduced using extensive national university reform. The reform in Finland changed the financial-administrative and legal operating frameworks of universities: the legal status of Finn-

ish universities, the internal institutional level governance, the appointment of the rector and the employment status of university staff. Universities became financially and legally independent and responsible actors. This is to say that, as individual legal and financial entities, universities have full capabilities and financial powers to act in an organization's own name.

A pervasive goal of the Finnish university autonomy reform is to increase the competitiveness of Finnish universities (Ministry of Education, 2007; Kotiranta et al., 2009). Competitiveness is increasingly driven through the ideas of the innovation system both in Finland and elsewhere (Ministry of Employment and the Economy, 2009; Ministry of Education and Culture, 2011; European Commission, 2005; Lavoie, 2009; Luoma et al., 2011). Universities as creators and disseminators of new knowledge and producers of human capital are expected to enhance social and economic development through education and research (Lavoie, 2009; van Vught, 2009).

In Europe, the usefulness of science to society and competitiveness through innovation are very topical higher education

policies (European Commission, 2006 and 2010; van Vught, 2009). For universities, this means operating in market-type conditions, attracting external funding and seeking strategies to perform better. Universities in Australia, the UK and the US are the forerunners in this respect. Universities in Finland and continental Europe are in the transformational process of taking steps towards the same direction. (McKelvey and Holmén, 2009). In Finland and elsewhere, higher education institutions are widely recognized as an integral part of national innovation systems (e.g. Hazelkorn, 2005; Lundvall, 1992; Park and Lee, 2005; Wiczorek and Hekkert, 2012). The international team evaluated the Finnish national innovation system and pointed out that 'giving much more financial and operational autonomy to the universities is likely to enhance innovation and university-industry collaborative research by providing more incentives for that' (Ministry of Employment and the Economy, 2009; 124). In this evaluation, strong autonomy is seen as an incentive for universities to improve their innovation performance. Finnish innovation performance is considered among the best in the world. Out of 71 countries in the recent global innovation ranking index, Finland was number six when measuring input performance and number eight when measuring output side performance (Dutta and Lanvin, 2013).

A few earlier studies have focused on the multifaceted phenomenon of the financial autonomy of universities in their competition driven circumstances. Moreover, previous research has neglected to examine the implications of financial autonomy inside or outside universities, though the reform ideologies around financial autonomy are targeted to enhance the competitiveness and performance of universities. The financial autonomy of modern universities is dynamic and has many dimensions, taking its shapes in different ways in different contexts and times and depending, among other factors, on who interprets its content regarding whom and why (Author, 2012).

The purpose of this paper is to analyze linkages between national innovation performance and the financial autonomy of universities in Finland from a European perspective. This study will discuss possible linkages between the extent of financial autonomy and country specific input innovation performance in Finland and other European countries. Finland is considered an example of an individual country, due to its financial autonomy reform and its status as one of the top ten countries in global rankings of innovation performance. In this ranking, Finland placed, for example, first in human capital and research (Sweden number 6, Austria 8, Denmark 9 and United Kingdom 10), which was one of the sub-factors measuring input innovation performance (Dutta and Lanvin, 2013; see also European Commission, 2013; Park and Lee, 2005). Input innovation factors are the enablers of the innovation economy. Therefore, this study will focus on possible relationships between financial autonomy and input innovation performance, and if input and output innovation performance are linked to each other.

Financial autonomy of universities

Despite the significance given to the financial autonomy of universities (see e.g. Christensen, 2011; de Dominicis et al., 2011; Mitsopoulos and Pelagidis, 2008; Volkwein and Malik, 1997; Ministry of Education and Culture Finland, 2007) both empirical and theoretical approaches focusing on financial autonomy have been narrow, technical and largely directed to state steering and control. Attention has been paid to the formal, prevailing legal, political, and financial relationships between state authorities and universities in a national context. The active use and positive consequences of financial autonomy seem to be taken for granted.

Financial autonomy has been typically measured in previous studies and reports as a scale: low, medium and high (Hoareau et al., 2013; de Dominicis, 2011; Author, 2012). Universities can have low financial autonomy in some dimensions and high financial autonomy in others (Author, 2012; Christensen, 2011; cf. Enders et al., 2013). By measuring the degree of financial autonomy, the picture of financial autonomy is a detailed list of applicable conditions and restrictions concerning the generation and use of financial resources. In this approach, dimensions of autonomy manifest as freedoms such as 'freedom to borrow money', 'freedom to set tuition and fees', 'freedom to create legal entities' and 'freedom to enter

into contracts'. These dimensions of financial autonomy can be understood as illustrations of formal financial autonomy that actually, according to Christensen (2011), lead to higher formal autonomy, but lower real autonomy. Measuring dimensions of financial autonomy reveals that the phenomenon and its attributes are understood to be empirically observable; the substance of it, definable; and the amount of its dimensions, quantifiable. These features also imply, based on the above discussion, that it is actually a measurement-based stimulus (the scope of financial autonomy) that is believed to carry and drive the performance of universities. Autonomy is considered one major element in universities' capacity to compete and respond efficiently to the demands and expectations of society in Europe (European Commission, 2006). When universities play a key role in the global competition of knowledge economies and in contributing to social, economic and cultural development, new knowledge of the linkages between financial autonomy and the performance of universities is needed.

Challenges of higher education and innovation policies in Europe

The significance of higher education institutions is acknowledged as part of higher education, research and innovation policies by the European Union (Ministry of Employment and the Economy, 2009; van Vught, 2009). Based on the ideas and concepts of an innovation system, the Lisbon Strategy aimed to create a knowledge-based Europe by 2010. Due to this unachieved goal, the new 'knowledge and innovation for growth' tries to form a strategy for a new innovation agenda (European Commission, 2005 and 2010; van Vught, 2009). Universities and other higher education institutions have an important role to enhance the new knowledge and innovation for growth. Accordingly, higher education policies, science policies and innovation policies are increasingly interrelated in Europe. All these policies support promoting systematic interaction between key actors and mechanisms to assure competitiveness and long-run co-operation.

The main challenges related to policy goals are to implement and achieve ambitious goals in currently volatile environments. The current dynamic transformation of the university environment and, specifically, the economic environment require paying attention to the enabling elements and actual performance of the innovation system (cf. Ritsilä et al., 2008). In Europe, higher education policies are not in the same development phases and do not all go in the same direction. There are, for example, countries that have strengthened university autonomy and countries that have restricted autonomy (Hoareau et al., 2013).

In an international evaluation of the Finnish innovation system, Finnish higher education and research structures were criticized as too fragmented. Research outputs – measured as publications – in relation to research inputs were too low. Internationalization was too low, and student graduations were deemed late (Ministry of Employment and the Economy, 2009). The latest Finnish national higher education policies emphasize building larger, efficient institutional and subunit level structures, profiling universities, improving the capacities for research specifically in research-intensive universities, strengthening the financial autonomy of universities, diversifying university funding structures, integrating quality assurance mechanisms in the funding systems of universities, increasing internationalization and speeding up graduation (Ministry of Education and Culture, 2011). All of these are designed to establish better competitiveness and ensure that universities will be in a position to utilize their potential fully.

As stated above, higher education and innovation policies are interrelated in Europe (see also e.g. European Commission, 2006). Universities and higher education are also actively included in governmental innovation strategies (Ministry of Education and Culture, 2011; Ritsilä et al., 2008). In eight European countries, higher education and innovation are integrated into the same sectoral ministry: for example, in Denmark, the Ministry of Science, Innovation and Higher Education, and in the UK, the Department for Business, Innovation and Skills. Some other countries aim to coordinate by cooperating on sectoral ministries to enhance innovation (Hoareau et al., 2013).

New frameworks for institutional financial autonomy are expected to provide tools to shape relationships between universities and society. The idea is to provide better opportunities for universities to serve and cope with their environments, to diversify funding bases and to increase universities' competitiveness and effectiveness (Ministry of Education, 2009 and 2011; see also Piironen, 2013).

Empirical consideration

This paper will discuss by comparing the levels of different dimensions of institutional financial autonomy of universities with national innovation input performance in European countries. If statistical connections between the levels of financial autonomy and input innovation performance are found, it will be considered what aspects within financial autonomy yield the connections. Linkages between input innovation performance and output innovation performance will be also discussed.

'Financial autonomy' was analyzed as the authority to acquire and allocate financial resources (Author, 2012). The marking of "*" (figure 1) refers to the dimensions of institutional financial autonomy of Finnish universities as highlighted in the university reform (see Ministry of Education and Culture, 2007).

recoded into the two levels of financial autonomy in each dimension identified above as 'low financial autonomy' (=low and medium low) and 'high financial autonomy' (=high and medium high). The country-specific average amount of financial autonomy was measured using the scale of 'low' and 'high' by counting country-specific medians.

The data concerning the enablers of innovation performance are based on the international innovation ranking index (Dutta and Lanvin, 2014)¹. In this ranking, input innovation performance and output innovation performance were measured using a huge set of various types of input and output indicators. 'Input performance' refers to factors and conditions enabling and enhancing innovation in an economy. From this data base, of the five components measuring input innovation two were used 1) human capital and research and 2) innovation linkages. Inside these components, there are three factors related to university activities and the direct or indirect results of university activities (see figure above) in each country considered. In this paper, innovation input factors contain three sub-factors 1) tertiary education and 2) research and development (R & D) and 3) innovation linkages. Factor 'Tertiary education' measures the ratio of total tertiary enrolment to the population of the age group that

| Financial autonomy | Input innovation performance | Output innovation performance |
|---|--|--|
| <ul style="list-style-type: none"> • Authority to allocate core funding, establish legal entities*, own buildings*, borrow money*, charge tuition fees, keep surpluses • Authority to decide on overall student numbers, authority to establish degree programmes at 1) bachelor's level, 2) master's level and 3) doctoral level, terminate degree programmes • Authority to decide salaries for senior administrative staff, decide salaries for senior academic staff, appoint senior academic staff, appoint senior administrative staff | <ul style="list-style-type: none"> • Tertiary education: Tertiary enrolment, graduates in science and engineering, tertiary inbound mobility • Research and development (R & D): Researchers, gross expenditure on R & D (GERD), QS university ranking average score of 3 top universities • Innovation linkages: University/industry research collaboration, state of cluster development, GERD financed by abroad, joint venture/strategic alliance deals, patent families filed in at least three offices | <ul style="list-style-type: none"> • Knowledge technology outputs • Creative outputs |

Figure 1. Variables of institutional financial autonomy, input innovation performance and output innovation performance

The above variables were proxies to measure different dimensions of financial autonomy (Cazenave, 1982; Jongbloed et al., 2010; McDaniel, 1996; Author, 2012), input innovation performance (Dutta and Lanvin, 2014) and their linkages. Factors in the left side reflect the acquisition and allocation of resources of higher education institutions from the financial perspective. Most of the variables measuring financial autonomy also represent tools for universities to balance their finances by applying strategies to reduce their costs or increase their revenues. Such strategies take place, for example, through limiting or increasing the number of students enrolled, changing student-staff ratios or increasing tuition fees (Hauptman and Nolan, 2011; see also Capaldi, 2009).

The variables measuring financial autonomy were established using the report published by the European University Association (Estermann et al., 2011; see also Hoareau et al., 2013, and Jongbloed et al., 2010). In the EUA's report, the levels of different categories and dimensions of autonomy were empirically measured with 'low', 'medium low', 'high' and 'medium high'. In the present study, these levels were

corresponds to the tertiary level of education, the shares of graduates in science and engineering and the share of students from abroad of the total tertiary enrolment in that country. Factor 'R & D' describes the number of researchers, total domestic expenditure on R&D during a given period as a percentage of GDP, and average score of the top 3 universities at the QS (Quacquarelli Symonds Ltd, QS World University

¹ "The Global Innovation Index is co-published by Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO, an agency of the United Nations, UN).

The core of the GII Report consists of a ranking of world economies' innovation capabilities and results. The GII has established itself as a leading reference on innovation. Understanding in more detail the human aspects behind innovation is essential for the design of policies that help promote economic development and richer innovation-prone environments locally. Recognizing the key role of innovation as a driver of economic growth and prosperity, and the need for a broad horizontal vision of innovation applicable to developed and emerging economies, the GII includes indicators that go beyond the traditional measures of innovation such as the level of research and development." (Global Innovation Index Edition 2014).

Ranking) per country. Factor 'Innovation linkages' contain the average level of university/industry collaboration, the average state of cluster development (geographical or field specific), percentage of gross expenditure on R&D financed by abroad, number of joint ventures/strategic alliances and the number of inter-related patent applications (Dutta&Lanvin, 2014).

Output innovation performance means the results following from innovative activities within an economy. The measures of the knowledge and technology outputs component are indicators measuring knowledge creation, knowledge impact and knowledge diffusion. The creative outputs component consists of indicators measuring intangible assets, online creativity and creative goods and services (Dutta&Lanvin, 2014).

Possible connections between the level of financial autonomy and national input innovation performance were analyzed in cross-country comparisons using SPSS statistics. Countries were categorized into the subgroups according to their average level of financial autonomy and input innovation performance. A non-parametric Kruskal-Wallis test and Pearson's correlation analysis were conducted (Vogt, 2011) between the subgroups to test possible differences between them. The significance levels applied in testing were $P \leq 0.001^{***}$, $P \leq 0.01^{**}$ and $P \leq 0.05^*$.

Country codes applied in this paper

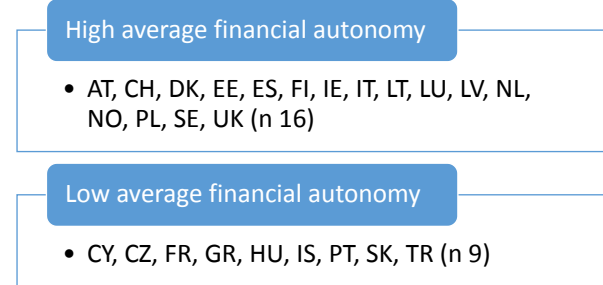
| | |
|--------------------|-----------|
| Austria | AT |
| Cyprus | CY |
| Czech Republic | CZ |
| Denmark | DK |
| Estonia | EE |
| Finland | FI |
| France | FR |
| Greece | GR |
| Hungary | HU |
| Iceland | IS |
| Ireland | IE |
| Italy | IT |
| Latvia | LV |
| Lithuania | LT |
| Luxembourg | LU |
| Netherlands | NL |
| Norway | NO |
| Portugal | PT |
| Slovakia | SK |
| Slovenia | SI |
| Spain | ES |
| Sweden | SE |
| Switzerland | CH |
| Turkey | TR |
| United Kingdom | UK |

Statistical findings
The levels of financial autonomy and input innovation performance

Most European countries enjoyed on average high financial autonomy (table 1). One of Nordic countries (Iceland) had low financial autonomy, while its eight counterparts were from Middle Europe or from South Europe. All other Nordic countries including Finland had on average high financial autonomy. The same applied to the rest of the European countries considered. It is worth noting that the level of financial autonomy was measured using two categories 'low' and 'high'.

Average level of financial autonomy

Table 1



(Germany not included)

Half of the European countries belonged to the group of high input innovation performance, when examining the country-specific rankings in relation to the average level of innovation performance of these countries.(Table 2, next page). A strong positive correlation between the input innovation factors were found; R & D and Innovation linkages ($R=0.65$ $P=0.000^{***}$), Tertiary education and Innovation linkages ($R=0.61$ $P=0.001^{**}$) and between Tertiary education and R & D ($R=0.59$ $P=0.002^{**}$). Hence, if the country had high performance in one innovation input factor this means that the country ranked well also in two other input performance factors.

Based on the average performance of 26 European countries (EU-countries including Switzerland and Norway), the country-specific performance are presented below in high-performing and low-performing groups.

Table 2

European countries grouped into high and low level innovation performance

| Inputs | Low innovation performance | High innovation performance |
|----------------------------------|--|---|
| Tertiary Education | <45.44 DK, HU, EE, IS, IT, LT, LV, NL, NO, PL, PT, SK, TR (n 13) | ≥ 45.44 AT, CH, CZ, CY, DE, ES, FI, FR, GR, IE, LU, SE, UK (n 13) |
| R & D | <41.62 CY, CZ, EE, ES, GR, HU, IT, LT, LU, LV, PL, SK, TR (n 13) | ≥ 41.62 AT, CH, DE, DK, FI, FR, IE, IS, NL, NO, PT, SK, UK (n 13) |
| Innovation linkages | <37.37 CZ, EE, ES, GR, HU, IS, IT, LT, LV, PL, PT, SK, TR (n 13) | ≥ 37.37 AT, CH, CY, DE, DK, FI, FR, IE, LU, NL, NO, SE, UK (n 13) |
| Outputs | | |
| Knowledge and technology outputs | <40.06 AT, CY, CZ, DE, DK, EE, ES, GR, IS, LR, LU, LV, NO, PL, PT, SK., TR (n 17) | ≥ 40.06 CH, FI, FR, HU, IE, IT, NL, SE, UK (n 9) |
| Creative outputs | <51.72 AT, CZ, ES, FR, GR, HU, IE, IT, LT, LV, PL, PT, TR (n 14) | ≥ 51.72 CH, CY, DE, DK, EE, FI, IS, LU, NL, NO, SE, UK (n 12) |

(Germany included)

In the following section, it will be discussed if the dimensions of financial autonomy are statistically related to input innovation performance.

Dimensions of financial autonomy and input innovation performance

The financial autonomy related to public funding and degree programmes were critical to input innovation performance in Europe. The type of public funding, authority to establish bachelor's degree programmes, master's degree programmes and doctoral programmes generated statistical country differences to input innovation performance. This is to say that dimensions such as authority to own buildings, to establish legal entities or to set tuition fees did not yield statistically significant differences. The four important dimensions of financial autonomy will be discussed below.

Table 3

The best performing countries in Europe and the four dimensions of financial autonomy yielding differences between European countries

| Input innovation factor Tertiary education: Tertiary enrolment, graduates in science and engineering, tertiary inbound mobility | Input innovation factor R & D: Number of researchers, gross expenditure on R & D (GERD), average score of the top 3 universities at the QS world university rankings | Input innovation factor Innovation linkages: University/industry research collaboration, state of cluster development, GERD financed by abroad, joint venture/strategic alliance deals, patent families filed in at least three offices | 1) Type of public funding (block grant) r=restrictions | 2) Authority to establish bachelor's degree programmes (r=restriction) | 3) Authority to establish master's degree programmes | 4) Authority to establish doctoral programmes |
|---|---|--|--|--|--|---|
| Austria (4 th) | Finland (3 rd) | Luxembourg (6 th) | A r FI LU | A FI r LU | A FI r LU | A FI r LU |
| Luxembourg (8 th) | Denmark (4 th) | Switzerland (8 th) | LU DK CH | LU DK r CH | LU DK r CH | LU DK CH |
| UK (12 th) | Sweden (5 th) | UK (13 th) | UK SE r | UK SE r | UK SE r | UK SE r |
| Finland (15 th) | Switzerland (9 th) | Finland (16 th) | FI CH | FI r CH | FI r CH | FI r CH |
| Greece (17 th) | Germany (10 th) | Ireland (17 th) | GR r D IE r | GR r D IE | GR r D IE | GR r D IE |
| France (18 th) | UK (11 th) | Sweden (19 th) | FR r UK SE r | FR r UK SE r | FR r UK SE r | FR r UK SE r |

Input innovation factor 'Tertiary education': In total data, authority to establish bachelor's degree programmes (P=0.006**), master's degree programmes (P=0.006**) and doctoral programmes (P=0.020*) generated statistical country differences to input innovation performance concerning tertiary education. In 'Tertiary education', the five best performing European countries were Austria (4th), Luxembourg (8th), United Kingdom (12th), Finland (15th) and Greece (17th). Of these five countries Luxembourg and UK have full financial autonomy in the type of public funding and introducing new degree programmes. Austria has financial autonomy to introduce new programmes in all levels of higher education, but has restrictions in the type of public funding. Finland has restrictions in introducing new study programmes, but not in the type of public funding. Greece has a line-item public

funding system and restrictions in introducing degree programmes.

Input innovation factor 'R & D': The type of public funding (P=0.006**); authority to establish bachelor's degree programmes (P=0.007**), master's degree programmes (P=0.007**) and doctoral programmes (P=0.001****) generated statistical country differences to input innovation performance. In R & D, the five best performing European countries were Finland (3rd), Denmark (4th), Sweden (5th), Switzerland (9th) and UK (11th). In 'R & D' Finland performed much better than in 'Tertiary education'. However, Finland, Sweden and Denmark are the Nordic countries in which the four dimensions of financial autonomy are somehow restricted. Denmark has restrictions in establishing bachelor's and master's degree programmes. In Sweden, block grant is split into several categories and universities have no freedom to move funding between these. Sweden has also restrictions in introducing new study programmes in bachelor's, master's and doctoral levels. Switzerland and UK have freedoms in all four dimensions of financial autonomy, but they do not perform better in R & D compared to Finland, Denmark or Sweden.

Input innovation factor 'Innovation linkages': It seems that the same four dimensions of financial autonomy as discussed above generated statistical differences related to 'Innovation linkages' performance in Europe. These factors were the type of public funding (P=0.003**); authority to establish bachelor's degree programmes (P=0.003**), master's degree programmes (P=0.003**) and doctoral programmes (P=0.000***). In 'Innovation linkages', the five best performing European countries in the global innovation ranking were Luxembourg (6th), Switzerland (8th), United Kingdom (13th), Finland (16th) and Ireland (17th). Only two European countries, namely Luxembourg and Switzerland, succeeded to get a place among the ten best 'Innovation linkages' performers globally.

Although, the four elements of financial autonomy yielded differences in total data, correlations between these elements and input innovation performance in the eleven countries identified in the table 3 were found only related to innovation linkages. Innovation linkages were positively correlated with the type of public funding and (R=0.65 P=0.042*), bachelor's degree programmes, (R=0.77 P=0.010**), master's degree programmes (R=0.77 P=0.010**) and doctoral programmes (R=0.67 P=0.001***). Tertiary education and R & D did not correlate with the four elements of financial autonomy in these eleven countries that performed well in their innovation input performance. When considering linkages between the other elements of financial autonomy and input innovation performance, some new correlations were identified: Tertiary education and the length of public funding had very strong positive correlation (R=0.80 P=0.006****) and Tertiary education and authority to decide on salaries of senior academic staff had negative correlation (R=-0.65 P=0.044**).

An interesting question is if there are countries having low financial autonomy and high input innovation performance. The findings showed that France has low financial autonomy concerning the type of public funding and establishing degree programmes while it has high input innovation performance (ranking places in the global ranking 'Tertiary education' 18th, 'R & D' 15th and 'Innovation linkages' 43rd). France is a large high-income economy and its gross domestic expenditure on R & D has not decreased due to economic crisis since 2008 or 2009. France was number 8 in QS ranking that measures country's three top universities' performance (Dutta&Lanvin, 2014). Estonia had on average high financial autonomy in the four dimensions, but its input innovation performance was low.

Despite the majority of European countries had on average high overall financial autonomy, 13 countries (CY, CZ, ES, FR, GR, HU, IS, LT, LV, PL, PT, SK and TR) did not enjoy high financial autonomy concerning the four dimensions as specified above. As can be noted Denmark, Estonia, Italy, Netherlands and Sweden are not in the list above despite the fact they have on average high financial autonomy. Italy, for example, has low financial autonomy in establishing degree programmes and low input innovation performance. Denmark has restrictions in establishing degree programmes, in the

ranking Denmark performed well and had 19th place in 'Tertiary education', 4th in 'R & D' and 38th in 'Innovation linkages'. Sweden has restrictions in the type of public funding; its place in the ranking was 20th in 'Tertiary education', 5th in 'R & D' and 19th in 'Innovation linkages'. Netherlands has restrictions in establishing doctoral programmes. Netherlands place was 59th in 'Tertiary education', 18th in 'R & D' and 23rd in 'Innovation linkages'.

Thus far, it was found that there are four important dimensions within financial autonomy that are statistically related to input innovation performance in some European countries. These results may imply that the lack of these factors can weaken innovation performance in countries where the levels of these dimensions are low. However, Iceland and France had high input innovation performance with low overall financial autonomy. In these countries, universities had high financial autonomy in keeping surpluses, borrowing money (France only), terminating education programmes, deciding on salaries of staff and recruiting administrative and academic staff (Iceland only).

Low financial autonomy and low input innovation performance

Five European countries had both low financial autonomy in four dimensions identified above and low input innovation performance. The countries were Czech, Greece, Hungary, Slovakia and Turkey. None of these countries had high financial autonomy in establishing bachelor's, masters or doctoral programmes. These countries had also low financial autonomy regarding the type of public funding. The findings indicated that this country group had low financial autonomy in many other dimensions too. However, some of these countries enjoyed high autonomy regarding keeping surpluses, borrowing money, terminating study programmes, deciding the salaries of senior academic staff and senior academic or recruiting senior administrative staff. A financial autonomy reform in Europe aims to drive and strengthen similar elements in financial autonomy. However, autonomy is always highly context and country related. A question that arises is, do these other dimensions of high financial autonomy matter to these countries' input innovation performance. Only one dimension produced statistically significant difference. The level of authority to charge tuition fees from non-EU students – that was high in Hungary, Portugal, Slovakia and Turkey – and Tertiary Education were negatively correlated ($R=-0.88$ $P=0.021^{***}$).

Linkages between input and output innovation performance

Output performance is measured by knowledge technology outputs including the creation, impact and diffusion of knowledge. Creative outputs include intangible assets, creative goods and services, and online creativity (Dutta&Larvin, 2014). In total data, tertiary education and knowledge technology outputs were not related, while tertiary education and creative outputs had a positive correlation. R & D and innovation linkages correlated very significantly with both output factors.

Table 4

Linkages between input and output innovation measures in 24 European countries

| |
|---|
| Tertiary education and Knowledge technology outputs, no statistically significant correlation |
| Tertiary education and Creative outputs (R 0.52 $P=0.007^{**}$) |
| R & D and Knowledge technology outputs (R 0.65 $P=0.000^{***}$) |
| R & D and Creative outputs (R 0.51 $P=0.000^{***}$) |
| Innovation linkages and Knowledge technology outputs (R 0.73 $P=0.000^{***}$) |
| Innovation linkages and Creative outputs (R 0.76 $P=0.000^{***}$) |

The table below shows correlations between input and output measures in countries that performed well in input innovation performance (countries in table 3 in section Dimensions of financial autonomy and input innovation performance). In this country group, an interesting finding was that there are no linkages between tertiary education and output innovation performance. R & D and knowledge and technology outputs had a strong positive correlation. Innovation linkages and both output innovation measures correlated.

Table 5

Linkages between input and output innovation performance in eleven best performing European countries (input side performance AT, CH, DK, FI, FR, DE, GR, IE, LU, SE, UK)

| |
|--|
| Tertiary education and Knowledge technology output, no statistically significant correlation |
| Tertiary education and Creative outputs, no statistically significant correlation |
| R & D and Knowledge technology outputs (R 0.63 $P=0.020^{**}$) |
| R & D and Creative outputs, no statistically significant correlation |
| Innovation linkages and Knowledge technology outputs (R 0.62 $P=0.024^{**}$) |
| Innovation linkages and Creative outputs (R 0.77 $P=0.002^{**}$) |

The table 6 shows correlations between input and output innovation performance in other European countries. In this country group R & D and creative outputs correlated. Innovation linkages correlated with both output factors.

Table 6

Linkages between input and output innovation performance in other European countries (CY, CZ, EE, ES, HU, IS, LT, LV, NO, NL, PL, PT, SK, TR)

| |
|--|
| Tertiary education and Knowledge technology output, no statistically significant correlation |
| Tertiary education and Creative outputs, no statistically significant correlation |
| R & D and Knowledge technology outputs, no statistically significant correlation |
| R & D and Creative outputs ($R=0.59$ $P=0.034^{***}$) |
| Innovation linkages and Knowledge technology outputs (R 0.75 $P=0.003^{**}$) |
| Innovation linkages and Creative outputs (R 0.72 $P=0.005^{**}$) |

Conclusion

This paper examined connections between national innovation performance and dimensions of institutional financial autonomy of universities in 25 European countries. Most European university reforms drive increases towards autonomy as tools for making universities more competitive (Christensen, 2011; Enders et al., 2013; McKelvey and Holmén, 2009). This implies serving expectations to facilitate universities' engagements with society. Engagements with society can be characterized in various ways. From the stakeholders' perspective, financial autonomy can be seen as a tool to enhance national innovation performance. The various elements of formal institutional financial autonomy do not as such illuminate whether one element, several elements or all of them regarding financial autonomy are in real use (Christensen, 2011; Author, 2012) and will lead to better innovation performance.

This study suggests that the potential for better innovation performance is linked to certain dimensions of financial

autonomy of universities. In Europe, the better the country's innovation performance, the more the country's universities have financial autonomy. Finland, UK, Luxembourg and the Netherlands are examples of these countries. Moreover, success in input innovation performance is linked to success in output innovation performance. However, there is no single element in financial autonomy that would explain success in innovation performance. There are four important dimensions within financial autonomy that are statistically related to input innovation performance in some European countries. They are form of public funding and authority to establish degree programmes in bachelor, master and doctoral levels. However, some other dimensions within financial autonomy were important in countries with low innovation performance. Examples are authority to terminate degree programmes and charge tuition fees. This implies that autonomy is context-related issue and similar elements in financial autonomy do not lead to similar performance.

Overall, measuring and comparing innovation performance and financial autonomy are methodologically complex and need careful further analytical context-related discussion to draw deeper conclusions.

References

- Aghion, P., Dewatripont, M., Hoxby, C.M., Mas-Colell, A. and Sapir, A. (2009) 'The Governance and Performance of Research Universities: Evidence from Europe and the US', NBER Working Papers 14851, National Bureau of Economic Research, Inc. <http://www.nber.org/papers/w14851.pdf>
- Amaral, A., Tavares, O., and Santos, C. (2013) 'Higher Education Reform in Portugal: A Historical and Comparative Perspective of the New Legal Framework for Public Universities', Higher Education Policy 26(1): 5-24. doi:10.1057/hep.2012.29
- Capaldi, E. D. (2009) 'Intellectual Transformation and Budgetary Savings Through Academic Reorganisation', Change 41(4): 18-27.
- Cazenave, P. (1982) 'Financing of Institutions', in B. R. Clark and G. R. Neave (eds). The Encyclopedia of Higher Education, Analytical Perspectives, Oxford: Pergamon Press Ltd, pp. 1367-1376.
- Christensen, T. (2011) 'University governance reforms: potential problems of more autonomy?' Higher Education 62(4): 503-517. Academic Search Premier, EBSCOhost (accessed January 19, 2014).
- Clark, B.R. (1998) Creating Entrepreneurial Universities: Organizational Pathways of Transformation. Oxford: Pergamon.
- deDominicis, L., Pérez, S.E. and Fernández-Zubieta, A. (2011) European university funding and financial autonomy – A study on the degree of diversification of university budget and the share of competitive funding. European Commission. http://erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/generic_files/JRC63682.pdf
- Dutta, S. and Lanvin, B. (2013) Global Innovation Index 2013 – The Local Dynamics of Innovation. <http://www.globalinnovationindex.org/content.aspx?page=data-analysis>
- Enders, J., Boer, H., and Weyer, E. (2013) 'Regulatory autonomy and performance: The reform of higher education re-visited', Higher Education 65: 5-23. doi:10.1007/s10734-012-9578-4
- European Commission (2013) Innovation Union Scoreboard 2013, http://ec.europa.eu/enterprise/policies/innovation/files/ius-2013_en.pdf
- European Commission (2012) European Commission website. Modernizing Universities. http://europa.eu/legislation_summaries/education_training_youth/lifelong_learning/c11089_en.htm
- European Commission (2011) Communication from the Commission. Supporting growth and jobs – an agenda for the modernization of Europe's higher education systems. COM (2011) 567 final. Brussels: EC.
- European Commission (2010) Europe 2020 – A European Strategy for smart, sustainable and inclusive growth, Communication from the Commission. Brussels: EC. <http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%2007%20-%20Europe%202020%20-%20EN%20version.pdf>
- European Commission (2007) Communication from the Commission A coherent framework of indicators and benchmarks for monitoring progress towards the Lisbon objectives in education and training COM(2007) 61 final. Brussels: EC.
- European Commission (2006) Delivering on the modernization agenda for the universities. COM/2006/0208 final. Brussels: EC.
- Estermann, T. and Bennetot, P.E. (2011) Financially sustainable universities II. European universities diversifying income streams. Brussels: EUA Publications. <http://www.eua.be/Pubs/Financially%20Sustainable%20Universities%20II.pdf>
- Estermann, T., Nokkala, T. and Steinel, M. (2011) University Autonomy in Europe II. The Scorecard. Brussels: EUA.
- Global Innovation Index Edition 2014. <https://www.globalinnovationindex.org/content.aspx?page=GII-Home> Hazelkorn, E. (2005) 'University Research Management – Developing Research in New Institutions', Paris: OECD.
- Hoareau, C., Ritzén, J. and Marconi, G. (2012) The State of University Policy for Progress in Europe – Policy Report, United Nations University.
- Hood, C. and Peters, G. (2004). The middle age of new public management: Into the age of paradox, Journal of Public Administration Research and Theory, 14(3), 267-282.
- Huisman, J. (2007) The Anatomy of Autonomy. Higher Education Policy, 20: 219-221.
- Jongbloed, B., Boer, H., Enders, J. And File, J. (2010) Funding reform. Progress in higher education reform across Europe. Volume I: Executive summary and main report. Enschede. Center for Higher Education Policy Studies. <http://www.utwente.nl/mb/cheps/publications/Publications%202010/Funding%20Reform/FUN%20Vol%201%20Executive%20Summary.pdf>
- Jongbloed, B. (2010). Funding Higher Education: A view across Europe. http://www.utwente.nl/mb/cheps/publications/Publications%202010/MODERN_Funding_Report.pdf. Brussels: ESMU (European Centre for Strategic Management of Universities).
- Kotiranta, Annu and Nikulainen, Tuomo and Tahvanainen, Antti-Jussi and Deschryvere, Matthias and Pajarinen, Mika, 2009. «Evaluating National Innovation Systems – Key Insights from the Finnish Innoeval Survey.» Discussion Papers 1196, The Research Institute of the Finnish Economy.
- Lavoie, M. (2009) 'Harmonizing Higher Education and Innovation Policies: Canada from an International Perspective'. Higher Education Quarterly 63 (1): 3-28. doi:10.1111/j.1468-2273.2008.00406.x
- Lundvall, B.-Å. (Ed.) (1992) National Systems of Innovation: Towards a Theory of innovation and Interactive Learning. Pinter Publishers: London.
- Luoma, P., Raivio, T., Tommila, P., Lunabba, J., Halme, K., Viljamaa, K. and Lahtinen, H. (2011) Better results, more value – A framework for analysing the societal impact of Research and Innovation. Tekes Review 288/2011. http://www.tekes.fi/julkaisut/better_results_more_value.pdf
- McDaniel, O.C. (1996) 'The Paradigms of governance in higher education systems', Higher Education Policy 9(2), pp. 137-158.
- McKelvey and Holmén, (2009) Learning to compete in European universities – From social institution to knowledge business. Cheltenham: Edward Elgar Publishing Limited.
- Ministry of Education, (2007) 'Yliopistojen taloudellisen ja hallinnollisen aseman uudistaminen' [Reform of financial and administrative autonomy of universities]. Opetusministeriön työryhmämuistioita ja selvityksiä 2007:2, Helsinki: Yliopistopaino.
- Ministry of Education (2009) 'Steering and funding of universities from year 2010 forward'. Retrieved from http://www.minedu.fi/export/sites/default/OPM/Koulutus/yluopistokoulutus/hallinto_ohjaus_ja_rahoitus/yluopistojen_tulossopimukset/Sopimukset_2010_-_2012/ohjeet/RV_14102009_OPM_muistio.pdf
- Ministry of Education and Culture (2011) Development Plan for Education and Research 2011-2016. Retrieved from <http://www.minedu.fi/export/sites/default/OPM/Julkaisut/2012/liitteet/okm01.pdf?lang=fi>
- Ministry of Employment and the Economy. (2009) Evaluation of the Finnish National Innovation System. (2009). http://www.tem.fi/files/24929/InnoEvalFI_FULL_Report_28_Oct_2009.pdf OECD. (2009) OECD Reviews of Tertiary Education: Finland, Paris: OECD Publishing.
- Park, S., and Lee, S. (2005) 'The national and regional innovation systems in Finland: from the path dependency to the path creation approach'. AI and Society, 19(2):180-195. doi:10.1007/s00146-004-0305-2.
- Piironen, O. (2013) The Transnational Idea of University Autonomy and the Reform of the Finnish Universities Act. Higher Education Policy, 26(1): 127-146. doi:10.1057/hep.2012.22
- Ritsilä, J., Nieminen, M., Sotarauta, M., and Lahtonen, J. (2008) 'Societal and Economic Engagement of Universities in Finland: An Evaluation Model', Higher Education Management and Policy, 20 (2): 165-176.

37. Salmi, J. J. (2007) 'Autonomy from the state vs responsiveness to markets', *Higher Education Policy*, 20(3): 223–242.
38. Vogt, W. Paul. (2011) *SAGE quantitative research methods*, London: SAGE.
39. Volkwein, J.F. and Malik, S.M. (1997) 'State Regulation and Administrative Flexibility at Public Universities', *Research In Higher Education* 38(1): 17–42. Academic Search Premier, EBSCOhost (accessed January 19, 2014).
40. Van Vught, F. (2009) 'The EU Innovation Agenda: Challenges for European Higher Education and Research', *Higher Education Management and Policy*, 21(2): 13–34.
41. Wieczorek, A. J., and Hekkert, M. P. (2012) 'Systemic instruments for systemic innovation problems: A framework for policy makers and innovation scholars', *Science and Public Policy (SPP)*, 39 (1): 74–87. doi:10.1093/scipol/scr008

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THE ROLE OF MOOC IN UNIVERSITY'S LEADERSHIP STRATEGY

The paper presents the situation of transformation in higher education, which driven by the rising interest in Massive Open Online Courses (MOOCs). MOOCs seen as transformation drivers in all levels of education and are very important to lead in education sector. However, this transformation comes with the new challenges for higher education. Higher education institutions must revise current and offer new ways of course design and delivery as well as to adapt a learning process according to the new challenges. The Lithuanian case presented in this paper.

Keywords: OERs, MOOCs, pedagogical approach, methodological approach, higher education, challenges.

Introduction

The aim of the papers is to present the technological and methodological approach of the MOOCs suggested by leading universities of the world and to present the Lithuanian case with the research results on MOOC design and delivery.

The objectives of the research are to present the pedagogical and technological challenges for MOOCs design and to present the research data collected during the first national MOOCs delivery process in Lithuania.

Kaunas University of Technology joined OpenupEd initiative of EADTU with MOOC on Management in English language in 2013. Over 1500 interested students were registered and during the period of this MOOC delivery, about 600 of them actually took part in course activities but only 83 received a graduate certificate. We have developed a special portal (<http://open.ktu.lt>) based on Moodle principles as our main platform for the university offered MOOCs. In 2014 it was designed and delivered the national course on «Information technologies» with totally 2009 participants. The data analysis on the participants input presented in the paper below.

The influence of Open educational Resources in MOOCs delivery

Open educational resources (OERs) and massive open online courses (MOOCs) indicated as an impulse for transformation in any level education system and suggested by the universities leaders in all over the world.

Open Educational Resources is defined as any educational resources available at no or a little cost. The term includes any kind of educational resource such as textbooks, course readings, games, simulations and any other virtual material used for teaching and learning. The initiator of OERs was MIT university, which opened course material to wide society in early 2002 (1). However, UNESCO used the term «Open Educational Resource» in 2002. Nowadays, OERs recognized by core 5R activities (see figure 1). These 5R permissions, together with a clear statement that they provided free and in perpetuity and articulated in many of the Creative Commons licenses (2).

The 5R Permissions of OER

| | |
|--------------|-------------------------------|
| Retain | • Make and own copies |
| Reuse | • Use in a wide range of ways |
| Revise | • Adapt, modify, and improve |
| Remix | • Combine two or more |
| Redistribute | • Share with others |

Figure 1. 5R permissions of OER

A big challenge to MOOCs is a delivery for the wide society assuring massiveness and the keeping quality in education. Yuan and Powel (3) describe MOOC as a massive open online course (MOOC) purposed for unlimited number of participants and open access via the Internet. MOOCs provide various kind of content: course material, readings, problem sets and place for communication such as interactive user forums for communication maintain in community of students, professors or teaching assistants (4).

The open sharing of educational material, technologies and tools, methods and experiences creates new opportunities for innovation. Universities must offer courses, which satisfy the needs of business and public sectors and changes in students learning habits (5). Open and online education changes the education system, study programs and courses (6). Open education initiate international cooperation between educational institutions (7) (8). This openness become one of the main reasons for delivering open courses or services (8). Open education also does change the relation universities (9) (10) and service providers as well as companies for training offers (11) and investors, governments and foundations.

Research methodology

MOOCs have been popular for quite some time now (15). Many people from other countries use this model for learning (15). This convenient and completely free learning model helps to easier gain knowledge and learn via the