Assessment of the Factors Influencing Higher Education Funding Policies

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ABSTRACT

The aim of this article is to assess the factors that influencing higher education funding policies in Latvia.

To achieve the goal, the authors have performed a qualitative and quantitative analysis of scientific literature on factors that influencing higher education funding policies.

In order to achieve research results, the authors initially selected higher education funding policy influencing factors based on the European University Association research results (2016), further with the help of data analysis tool NVivo they analyzed scientific articles on the research topic.

To obtain empirical data, the authors have developed the questionnaire and adapted it for higher education professionals considering the outlined factors.

At the final stage of the research, the data was processed using SPSS: Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity, Cronbach's Alpha, Factor Correlation Matrix, Anti-image Correlation Matrix, Communalities.

Assessing the factors influencing higher education funding policies, the authors have come to the conclusion that in total there are 24 factors that can influence higher education funding.

Keywords: Higher Education, Funding, Policy, Influencing Factors, Latvia.

1. INTRODUCTION

In the recent years, higher education has been ascribed an increasingly greater role not only in meeting a broader public interest and promoting economic prosperity, but also in benefitting each individual on the way to promoting one's own material and spiritual development. This is evidenced by research conducted by Johnstone, (2005) and Yang & McCall (2014), as well as by other authors [1], [2]. Jongbloed (2008) stressed that the changes that occurred in the higher education system would endorse development potential of the entire European Union [3].

In addition, higher education has undergone considerable changes, for example, along with the growing autonomy of HEIs their funding polices have radically changed. In the context of funding policies, HEIs make a greater focus on their economic efficiency, performance indicators, responsibility and the role of students in the study process [4], [5], [6].

According to Estermann & Claeys-Kulik (2013), HEIs in the EU receive almost 75% of their funding from the public sources, whereas the remaining funds are raised from the private sources [7].

There is an ongoing discussion in the European Higher Education Area about efficient funding system and the main pillars of funding: performance-based funding, university mergers and funding for excellence [8]. Despite the common pillars of funding, while allocating public funding each EU state takes into consideration different factors influencing higher education financing formulas.

Also there are general tendencies in Europe and the world to reduce the amount of public funding allocated to higher education institutions, as demonstrated by Oliff et al. (2013), Hemelt & Marcotte (2008) and other [9], [10]. Certain countries in Europe, for example, Finland and Norway, provide higher education free of charge. However, reduction of the public funding may have adverse consequences, such as increasing tuition fees at the educational programs and diminishing quality of the study process [11], [12], [13], [14].

The goal of present article is to estimate factors that influencing higher education funding policies in Latvia.

To achieve the goal, a questionnaire, quantitative and qualitative methods, including the method of sociologic research, monographic and descriptive methods have been used.

2. LITERATURE REVIEW

Higher education financing systems are very complex. Therefore, financial systems as an integral part of the economic system are essentially empirical, a product of the human mind: a set of rules, schemes, arrangement of rules, schemes, arrangement of sequential operations.

Based on the financial systems, higher education financing is characterized not only by autonomy of higher education institutions in relation to the allocation and use of financial resources, it is also considered one of the most important mechanisms based on various funding source [8]. Research conducted recently attests that HEIs in different countries try to gain greater autonomy [15], [16].

Higher education and its funding policies are determined not only by responsible institutions and effective laws and regulations of each particular country, but also by general European strategies set by the European Union. The Sorbonne Declaration of 1998

can be mentioned as an inception of the European higher education based on the unified principles; it is considered the predecessor of the Bologna Declaration of 1999, which has been continuously updated and improved since. The Bologna Declaration is based on the following basic principles: converged degree structure (consecutive structure of obtaining degrees: Bachelor, Master and Doctoral), unified system of credits (ECTS), staff and student mobility options within the EU, international recognition of HEIs, quality of higher education and its conformity to general standards, life-long learning opportunities and the system of degrees and credits based on the Lisbon Recognition Convention [7]. According to the report of the European Higher Education Area (2016), the Bologna Declaration is implemented in 48 countries [18]. In turn, the Lisbon Strategy, which has been implemented in Europe since 2000, has experienced numerous changes. However, the idea behind the strategy remained unchanged and it still focuses on promotion of the knowledge-based economy [19]. The regulations discussed above are considered the basis of the current higher education policies in Europe.

In the present constantly changing environment, there is an ongoing discussion among researchers and higher education professionals about higher education funding policies and the contributing factors, as well as about the differences in tuition expenses in various European countries. For example, Johnstone et al, (2006) analyzed tuition expenses considering direct and indirect expense items, illustrating existing social and political disagreement on the subject [20]. In turn, Rutherford & Rabovsky (2014), Dougherty et al (2013) and other authors reflected upon the existing interrelatedness of performance-based funding policies at the state universities [21], [22], [23].

Analyzing Estermann & Claeys-Kulik (2013), it was concluded that financial sustainability is one of the most important challenges faced by the European higher education [7]. It should be based on sufficient public funding, autonomy and full awareness of HEIs expenses. Efficient financing is one of the most topical issues currently addresses by higher education funding policies, it should rest on three pillars: performance-based funding, university mergers and funding for excellence [8].

In each EU country, there is a set of different factors that influence funding formulas. For example, in Latvia these factors include the number of bachelor, master and doctoral students, whereas in Lithuania – the number of bachelor and master students, number of staff and floor surface [22].

3. METHODOLOGY

In order to evaluate the factors influencing higher education funding policies, the authors conducted the research in several stages.

During the first stage of research the authors conducted analysis of scientific literature on the factors influencing higher education funding. The factors were initially selected considering research results of the European University Association (2016) [22]. Then using data analysis software NVivo the authors analyzed research papers on the factors having an impact on higher education funding policies for the period from 2010 to 2016, 42 research papers from the relevant data bases in total.

During the second stage of research, the authors developed questionnaires based on the obtained results. Survey questions were grouped into two sections: 1) the first section comprised questions extracting demographic and personal data; 2) the second section comprised questions concerning factors influencing higher education funding models selected on the basis of research results of the European University Association (2016) and NVivo data analysis: F1 – number of bachelor students; F2 – number of master students; F3 – number of doctoral students; F4 – number of awarded bachelor degrees; F5 – number of awarded master degrees; F6 – number of awarded doctoral degrees; F7 – number of developed doctoral theses; F8 – amount of EU/ international funding; F9 – amount of external funding; F10 – research evaluations; F11 – number of ECTS; F12 – number of staff; F13 – research contracts; F14 – international students; F15 – scientific activities; F16 - successful patent applications; F17 – diversity indicators, F18 – international staff; F19 – graduate employment rate; F20 – floor space; F21 – community outreach; F22 – patent applications; F23 – national ranking, F24 – international ranking. [22].

The first section comprised both open and closed questions concerning such aspects as respondent's sex, age, education level and experience in the field of education. The second section comprised multiple choice questions using the five-point Likert scale (1 – strongly disagree; 2 – disagree; 3 – neither agree nor disagree; 4 – agree; 5 – strongly agree).

In total, 48 questionnaires were circulated among industry professionals, of which 33 were returned and recognized valid for further processing. The research was conducted from November 2016 to January 2017.

In the next stage of the research, the survey data were processed using SPSS:

1) In order to find out whether the questionnaire data can be used in factor analysis, they were initially tested for validity and reliability using Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity. Pallant (2013) discussed applicability of these tests in quantitative research data analysis and their relevance for factor analysis [24].

2) In addition, to attest applicability of the questionnaire results in factor analysis, validity and reliability tests were also performed using Cronbach's Alpha.

3) Correlation analysis was used to characterize the magnitude and directions of linear correlations among factors – Factor Correlation Matrix.

4) In this stage of data processing data reduction was performed: Kaiser's criteria, items were excluded from analysis and cumulative percent of variance.

5) It is necessary to use Communalities to show the proportion of the variance that is used for factor analysis.

4. RESEARCH RESULTS

During the first stage of research based on the NVivo analysis results the authors developed a table comprising the main factors influencing funding. The factors were compared with the results of research conducted by the European University Association in 2016. [22].

As seen in Table 1, higher education funding is based on the number of students at all cycles of tertiary education, as well as the number of alumni and internal and external funding. In turn, the results of research conducted by the European University Association (2016) show that higher education funding policies can be influenced not only by such indicators as the number of students and amount of funding raised [22]. Other factors, such as scientific activities, patents, national and international ranking and other factors shown in Table 1 should also be taken into consideration.

Table 1

Higher education funding policy influencing factors

European University Association research results (2016)	NVivo research results (by authors)
Number of bachelor students	Number of bachelor students
Number of master students	Number of master students
Number of doctoral students	Number of doctoral students
Number of awarded bachelor degrees	Number of awarded bachelor degrees
Number of awarded master degrees	Number of awarded master degrees
Number of awarded doctoral degrees	Number of awarded doctoral degrees
Number of doctoral theses	Amount of EU/ International funding
Amount of EU/ International funding	Amount of external funding
Amount of external funding	Research evaluations
Research evaluations	Number of staff
Number of ECTS	International students
Number of staff	
Research contracts	
International students	
Scientific activities	
Successful patent applications	
Diversity indicators	
International staff	
Graduate employment rate	
Floor space	
Community outreach	
Patent applications	
National ranking	
International ranking	

The data obtained from the answers to the questions concerning demographic and personal data demonstrated that 68% of respondents are female and 32% are male. The average age of respondents is 41 years, of all respondents 71% hold Master degree, but 29% PhD, 56% of all respondents work in the field of tertiary education for more than 10 years, 38% - from 5 to 10 years, but 6% - from 1 to 5 years.

Validity and Reliability test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity were used to test validity of the factors identified in the questionnaires for the present research. According to Kaiser (1970) and Williams et al. (2010), Kaiser-Meyer-Olkin statistical indicators can vary in the range from 0 to 1, and the recommended minimal value should exceed 0.5 to make the data valid for factor analysis [25, 26]. Bartlett's Test of Sphericity should be significant ($p < .05$) to be used in factor analysis [26].

Summary and analysis of the obtained results show that Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity considering the minimal values set in the scientific literature are valid for factor analysis. Kaiser-Meyer-Olkin Measure of Sampling Adequacy value is 0.526, and that is higher than 0.5. In turn, Bartlett's Test of Sphericity x^2 (276) = 506.475, $p < .001$ shows that there is strong correlation between higher education funding factors.

Table 2

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.526
Bartlett's Test of Sphericity	Approx. Chi-Square	506.475
	df	276
	Sig.	.000

Cronbach`s Alpha

As the result of SPSS analysis (reliability test) Cronbach's Alpha is 0.786, which indicated high reliability. Based on the research literature on Cronbach's Alpha value thresholds, they should be in the range from 0.70 to 0.95 [27], [28]. Thus it can be concluded that factor analysis can be used in the research conducted by the authors. The results are shown in Table 3.

Table 3

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.786	.783	24

Factor Correlation Matrix

According to Hair et al. (2010), the values of correlation matrix coefficients to be used in data analysis should be higher than 0.3 [29]. Based on the sum of these variables, in the correlation matrix there are 73 correlations, whose value is higher than 0.3: F7 and F1 – 0.302; F10 and F1 – 0.333; F17 and F1 – 0.365; F18 and F1 – 0.326; F19 and F1 – 0.537; F23 and F1 – 0.344; F24 and F1 – 0.343; F3 and F2 – 0.646; F6 and F2 – 0.719; F8 and F2 – 0.418; F9 and F2 - 0.410; F13 and F2 – (-)0.366; F16 and F2 – (-)0.425; F6 and F3 – 0.486; F7 and F3 – 0.318; F8 and F3 – 0.523; F10 and F3 – 0.395; F5 and F4 – 0.419; F6 and F4 – 0.467; F8 and F4 – 0.341; F9 and F4 – 0.398; F23 and F4 – 0.336; F6 and F5 – 0.554; F8 and F6 – 0.379; F9 and F6 – 0.422; F18 and F6 – 0.397; F8 and F7 – 0.567; F14 and F7 – 0.450; F17 and F7 – 0.469; F9 and F8 – 0.302; F16 and F9 – (-)0.316; F21 and F10 – 0.348; F23 and F10 – 0.424; F17 and F11 – 0.553; F18 and F11 – 0.594; F19 and F11 – 0.312; F24 and F11 – 0.738; F14 and F12 – 0.349; F17 and F12 – 0.524; F18 and F12 – 0.332; F20 and F12 – 0.304; F22 and F12 – 0.304; F23 and F12 – 0.308; F24 and F12 – 0.409; F14 and F13 – 0.314; F15 and F13 – 0.317; F16 and F13 – 0.317; F19 and F13 – 0.436; F21 and F13 – 0.576; F17 and F14 – 0.713; F18 and F14 – 0.545; F20 and F14 – 0.453; F22 and F14 – 0.348; F23 and F14 – 0.391; F24 and F14 – 0.430; F16 and F15 – 0.637; F19 and F15 – 0.376; F21 and F15 – 0.457; F21 and F16 – 0.548; F18 and F17 – 0.720; F19 and F17 – 0.318; F20 and F17 – 0.363; F22 and F17 – 0.351; F23 and F17 – 0.389; F24 and F17 – 0.656; F19 and F18 – 0.333; F20 and F18 – 0.446; F24 and F18 – 0.808; F21 and F19 – 0.306; F24 and F19 – 0.510; F22 and F20 – 0.361; F23 and F20 – 0.354; F23 and F22 – 0.384. However,

other values are below 0.3, which indicates that there are no multi collinearity problems among the factors.

Anti-image correlation Matrix

Kaiser-Meyer-Olkin value should be higher than 0.5, however, as seen in the Table 4, not all factor meet this criterion, therefore the factors whose values are lower than the threshold should be excluded from further analysis. Thus, the following factors were excluded: F3, F5, F6, F7, F8, F10, F11, F12, F15, F16, F18 (see Table 4).

Table 4

Anti-image correlation Matrix

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23	F24
F1	**.547**	.099	-.136	-.138	.226	-.091	-.278	.187	.082	-.274	-.207	.102	.262	-.053	-.182	.459	-.164	.230	-.436	-.216	-.355	-.109	.107	.103
F2	.099	**.565**	-.587	.080	.070	-.565	.023	.262	-.148	.147	-.058	.001	.109	-.030	-.457	.425	-.262	.406	.189	.150	.025	-.041	-.271	-.141
F3	-.136	-.587	**.499**	.105	-.114	.133	-.231	-.308	.154	-.447	.300	.135	-.096	-.030	.335	-.288	.381	-.377	.146	.183	.186	-.100	.205	-.222
F4	-.138	.080	.105	**.555**	-.241	-.371	-.284	.164	-.046	-.157	-.330	.273	-.061	-.106	-.053	.149	.147	.192	.281	.240	.101	.039	-.484	-.110
F5	.226	.070	-.114	-.241	**.449**	-.378	-.337	.072	-.178	.104	-.246	.185	-.379	-.158	-.040	.320	.198	.232	-.014	-.458	.101	-.059	.343	-.102
F6	-.091	-.565	.133	-.371	-.378	**.454**	.506	-.522	-.034	.084	.270	-.462	.048	.203	.277	-.471	.041	-.619	-.327	.017	-.114	.147	.171	.343
F7	-.278	.023	-.231	-.284	-.337	.506	**.440**	-.560	-.126	.157	.231	-.409	.058	.006	-.079	-.349	-.302	-.310	-.229	.091	.237	-.034	.113	.397
F8	.187	.262	-.308	.164	.072	-.522	-.560	**.485**	.113	.037	-.210	.299	.306	.085	-.149	.276	-.251	.479	.027	.022	-.073	-.037	-.256	-.142
F9	.082	-.148	.154	-.046	-.178	-.034	-.126	.113	**.653**	-.075	.103	.121	.284	.434	.021	-.067	-.331	-.097	-.038	-.017	.020	.015	-.240	.200
F10	-.274	.147	-.447	-.157	.104	.084	.157	.037	-.075	**.466**	.175	-.243	-.229	.364	.267	-.356	.074	-.220	-.046	-.020	-.089	.133	-.341	-.001
F11	-.207	-.058	.300	-.330	-.246	.270	.231	-.210	.103	.175	**.446**	-.318	.020	.487	.541	-.657	-.034	-.496	-.063	.282	.209	-.021	.138	-.378
F12	.102	.001	.135	.273	.185	-.462	-.409	.299	.121	-.243	-.318	**.464**	-.022	-.213	-.302	.400	-.122	.442	.309	-.191	.102	-.208	-.070	-.206
F13	.262	.109	-.096	-.061	-.379	.048	.058	.306	.284	-.229	.020	-.022	**.544**	.093	-.230	.063	-.596	.123	-.391	.196	-.250	-.042	-.009	.314
F14	-.053	-.030	-.030	-.106	-.158	.203	.006	.085	.434	.364	.487	-.213	.093	**.613**	.351	-.496	-.272	.455	-.146	.090	.026	-.009	-.302	.042
F15	-.182	-.457	.335	-.053	-.040	.277	-.079	-.149	.021	.267	.541	-.302	-.230	.351	**.348**	-.724	.405	-.463	-.159	.081	-.069	.142	.097	-.343
F16	.459	.425	-.288	.149	.320	-.471	-.349	.276	-.067	-.356	-.657	.400	.063	-.496	-.724	**.356**	-.133	.699	.140	-.253	-.288	.019	.009	.038
F17	-.164	-.262	.381	.147	.198	.041	-.302	-.251	-.331	.074	-.034	-.122	-.596	-.272	.405	-.133	**.679**	-.317	.218	.083	-.002	-.058	.002	-.325
F18	.230	.406	-.377	.192	.232	-.619	-.310	.479	-.097	-.220	-.496	.442	.123	-.455	-.463	.699	-.317	**.489**	.199	-.368	-.154	.182	.046	-.288
F19	-.436	.189	.146	.281	-.014	-.327	-.229	.027	-.038	-.046	-.063	.309	-.391	-.146	-.159	.140	.218	.199	**.577**	.097	.112	.109	-.203	-.483
F20	-.216	.150	.183	.240	-.458	.017	.091	.022	-.017	-.020	.282	-.191	.196	.090	.081	-.253	.083	-.368	.097	**.565**	.090	-.245	-.324	-.009
F21	-.355	.025	.186	.101	-.101	-.114	.237	-.073	.020	-.089	.209	.102	-.250	.026	-.069	-.288	.002	-.154	.112	.090	**.717**	-.307	-.060	.006
F22	-.109	-.041	-.100	.039	-.059	.147	-.034	-.037	.015	.133	-.021	-.208	-.042	-.009	.142	.019	-.058	.182	.109	-.245	-.307	**.744**	-.120	-.128
F23	.107	-.271	.205	-.484	.343	.171	.113	-.256	-.240	-.341	.138	-.070	-.009	-.302	.097	.009	.002	.046	-.203	-.324	-.060	-.120	**.579**	-.075
F24	.103	-.141	-.222	-.110	-.102	.343	.397	-.142	.200	-.001	-.378	-.206	.314	.042	-.343	.038	-.325	-.288	-.483	-.009	.006	-.128	-.075	**.676**

Total Variance Explained

The table presents the summarized results on Principal Axis Factor using direct oblimin rotation. Based on Kaiser's criteria, eigenvalues should be greater than 1.0. It can be seen from the Table 5 that there are 7 eigenvalues greater than 1.0 (Component 1, 2, 3, 4, 5, 6 and 7). Thus, the cumulative proportion of variance criteria with 7 components should satisfy the criterion of explaining 70% or more of the total variance and 7 components solution explain 76.006% of the total variance with component 1 contributing 20.991%, component 2 – 17.338%, component 3 – 10.922%, component 4 – 8.601%, component 5 – 6.431%, component 6 – 6.176%, component 7 – 5.538%. It can be concluded that the mentioned components show good cumulative percentage of variances

Table 5

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loading			Rotation Sums of Squared Loadings	
Comp.	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1	5.038	20.991	20.991	5.038	20.991	20.991	3.454	

Table 5 continued

1	2	3	4	5	6	7	8
2	4.161	17.338	38.329	.161	17.338	38.329	3.098
3	2.621	10.922	49.251	2.621	10.922	49.251	2.821
4	2.066	8.610	57.861	2.066	8.610	57.861	2.648
5	1.544	6.431	64.292	1.544	6.431	64.292	2.234
6	1.482	6.176	70.468	1.482	6.176	70.468	2.091
7	1.329	5.538	76.006	1.329	5.538	76.006	1.896
8	.966	4.023	80.029				
9	.931	3.879	83.908				
10	.717	2.987	86.895				
11	.637	2.655	89.550				
12	.511	2.130	91.680				
13	.470	1.960	93.640				
14	.363	1.512	95.152				
15	.322	1.343	96.495				
16	.187	.779	97.274				
17	.155	.645	97.919				
18	.132	.548	98.467				
19	.101	.420	98.887				
20	.086	.357	99.244				
21	.078	.327	99.571				
22	.051	.211	99.782				
23	.035	.144	99.926				
24	.018	.074	100.000				

Extraction Method: Principal Component Analysis

Communalities

The choice of the relevant criteria was based on Kaiser-Meyer-Olkin Measure of Sampling Adequacy, selecting the criteria that are higher than 0.5 as it can be seen in the Table 6, all factors included in the questionnaire can influence higher education funding policies.

Table 6

Communalities

	Initial	Extraction
F1	1.000	.570
F2	1.000	.841
F3	1.000	.811
F4	1.000	.735
F5	1.000	.827
F6	1.000	.883
F7	1.000	.896
F8	1.000	.808
F9	1.000	.636
F10	1.000	.734
F11	1.000	.801
F12	1.000	.569
F13	1.000	.728
F14	1.000	.735
F15	1.000	.763
F16	1.000	.728
F17	1.000	.856
F18	1.000	.876
F19	1.000	.711
F20	1.000	.644
F21	1.000	.790
F22	1.000	.634
F23	1.000	.757
F24	1.000	.907

Extraction Method: Principal Component Analysis.

5. CONCLUSIONS AND DISCUSSION

Within the framework of research on the factors influencing higher education funding policy, the authors identified 24 factors.

Based on the results of the conducted research. the authors have come to conclusion that such factors as F2 – number of master students; F3 – number of doctoral students; F5 – number of awarded master degrees; F6 – number of awarded doctoral degrees; F7 – number of doctoral theses; F8 – amount of EU/ international funding; F11 – number of ECTS; F17 – diversity indicators; F18 – international staff, and F24 – international ranking play a very significant role in higher education funding, whereas such factors as F1 – number of bachelor students; F12 – number of staff have very low significance. At the same time. such factors as F4 – number of awarded bachelor degrees; F9 – amount of external funding; F10 – research evaluations; F13 – research contracts; F14 - international students; F15 – scientific activities; F16 – successful patent applications; F19 – graduate employment rate; F20 – floor space. F21 – community outreach. F22 – patent applications; F23 – national ranking demonstrate average level of significance in Latvia higher education policy. The findings obtained by the authors appear to be in concord with the results gained by other researchers that such factors as the number of master and PhD students, master and doctor degrees awarded, international funding and staff, and international ranking have most important implications for higher education funding [30], [31].

Right now in Latvia such criteria as the number of bachelor, master and doctoral students are used in the funding formula. However, considering the research results, the authors recommend including in the Latvia funding formula the factors that have a significant impact (F5, F6, F7, F8, F17, F18, F24). The factors mentioned previously already play a significant role in devising funding formula in such EU countries as Denmark (F5), Finland (F5, F6, F7, F8, F11, F18), Norway (F6, F7, F11), Poland (F7, F8), Germany (F5, F6, F17, F18), and Romania (F24) [22].

In future the authors see it necessary to assess the factors influencing higher education in other EU countries. The results of such research will be helpful not only for researches but also for higher education policy makers.

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