

Baltic – Nordic Universities in the EU Research and Innovation Programme Horizon 2020

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Abstract

This study looks at the research education in universities and is aimed at assessment of the Baltic – Nordic Higher Education Establishments' participation to the EU Horizon 2020 Framework Programme on basis of the open source data. The author analyses university interest in Horizon 2020 support for doctoral students' training, correlation between university PhD intensity and involvement in research projects, correlation between Horizon 2020 success and World university rankings, participation comparison of Nordic universities versus the Baltic ones. A brief overview of universities' commitment to Sustainable development goals is also included.

The study concludes that Nordic universities are more thoroughly engaged than the Baltic ones and are taking advantage of the Horizon 2020 opportunities; however, Estonia has a remarkable success. Although Nordic universities are looking for collaboration partners further into Western Europe than to the neighbours across the Baltic Sea, for teaming activities Baltic universities choose Nordic mentors. Nordic universities are more involved in activities leading to excellent research. On contrary – in many cases participation of Baltic universities is limited to coordination of research activities without a direct access to the leading European science communities and respective possibilities for students.

Keywords: *Scientific and research education; Horizon 2020; Baltic – Nordic universities.*

1. Introduction

Fundamental principles laid down in the Magna Charta of the European Universities (Magna Charta Universitatum, 1988) emphasise close relationship of tuition with research: ‘Teaching and research in universities must be inseparable’. Therefore, in parallel to academic education, universities involve students also in research activities thus enriching their level of knowledge.

The major research and innovation programme Horizon 2020 is open to everyone. Higher Education Establishments (HES) are top beneficiaries of this programme for both participations (33%) and EU contribution (39%) received.

This study is targeted at assessment of the Baltic – Nordic HES participation to the Horizon 2020 activities based on open data: Dashboard (2020), Cordis (2020), Eurostat (2020), and ETER (2020). However, online databases are updated regularly, and the current study reflects results as of March 2020.

Earlier correlation for Horizon 2020 participation success and 15-year old students’ mean performance in OECD Programmes for International Student Assessment was analysed by Geske and Bērziņa (2017) concluding that there are no decisive factors responsible for success in the Horizon 2020.

2. Data Sample selection

A multi-level selection has been chosen for analysing HES performance according to country group, performance in Horizon 2020 and university’s research profile.

This survey focuses on Baltic – Nordic country group. In terms of Horizon 2020 it means: three ‘old’ member states (Denmark, Finland, and Sweden), three ‘new’ member states (Estonia, Latvia, and Lithuania) and two associated countries (Iceland and Norway). All of them are participants of the Nordic – Baltic space for higher education and research.

The top-500 Horizon 2020 performing HES have been selected (Dashboard, 2020): 52/51¹ organisations fit the sample requirements: 8 establishments in Denmark, Estonia – 4, Finland – 10, Iceland – 1, Latvia – 3/2, Lithuania – 2, Norway – 8, and Sweden – 16.

Further, according to the ETER – European tertiary education register (last data from 2016), only universities identifying themselves as research ones have been chosen for the study. Two universities in Norway and one in Sweden are excluded.

¹ Horizon 2020 data for University of Latvia and Institute of Solid State Physics, University of Latvia are merged

Considering the three above-mentioned prerequisites, 48 universities would form the study sample. However, due to space limitation only up to three (according to H2020 ranking) per country are included in the current study (Tab. 1). All Nordic HES (with exception of Iceland) rank among the top-100 universities according to Horizon 2020 ranking; two Estonian universities are in the second hundred. The list ends on Latvian and Lithuanian universities.

Table 1. Baltic – Nordic universities chosen for the study and their international ranking.

H2020 ²	THE ³	QS ⁴	CWUR ⁵	Institution Name (English)	Country	Acronym	National rank ⁵
5	101	81	39	University of Copenhagen	DK	KU	1
11	184	112	213	Technical University of Denmark	DK	DTU	3
20	115	145	95	Aarhus University	DK	AU	2
21	41		42	Karolinska Institute	SE	KI	1
23	96	107	134	University of Helsinki	FI	HY	1
25	96	92	141	Lund University	SE	LU, SE	4
32	131	119	56	University of Oslo	NO	UiO	1
34	201-250	98	118	KTH Royal Institute of Technology	SE	KTH	3
48	184	134	310	Aalto University	FI	AYO	2
58	401-500	359	162	Norwegian University of Science and Technology	NO	NTNU	2

² Dashboard, 2020

³ The Times Higher Education World University Rankings 2020

⁴ Quacquarelli Symonds World University rankings 2020

⁵ Center for World University Rankings 2019-2020

H2020 ²	THE ³	QS ⁴	CWUR ⁵	Institution Name (English)	Country	Acronym	National rank ⁵
69	201-250	163	261	University of Bergen	NO	UiB	3
78	251–300	395	376	Tampere University ⁶	FI	TaY	4
104	301-350	301	502	University of Tartu	EE	TÜ	1
190	801-1000	601- 650	1273	Tallinn University of Technology	EE	TTÜ	2
214	351-400	---	508	University of Iceland	IS	HI	1
~207	801- 1000	801- 100 0	1490	University of Latvia	LV	LU, LV	1
301	801-1000	801- 1000	---	Tallinn University	EE	TLÜ	
307	1001+	701- 750	---	Riga Technical University	LV	RTU	
361	1001+	751- 800	1631	Kaunas University of Technology	LT	KTU	3
385	801-1000	458	703	Vilnius University	LT	VU	1

3. Horizon 2020 activities

The latest official evaluation of the Horizon 2020 is available from 2017, and separate flash sheets from 2018 - 2019 (EC Horizon 2020 programme analysis, 2020). Published survey data differ from today's; although, some trends remain throughout the programme. This study looks at Baltic – Nordic HES participation in early 2020 for several selected topics.

3.1. Country collaboration and success

Figure 1 reflects relative collaborations (i.e., percentage of project partners from the respective country). Obviously, that for all selected countries Germany is the most frequent

⁶ Tampere University was created in January 2019 by merging the University of Tampere and Tampere University of Technology

partner due to its size (1st line: around 10% of collaborations), but for Germany Baltic countries is a minor partner (1st column, collaboration below 1%). But noteworthy is the country self-cooperation (highlighted diagonal boxes): the ‘big-5’ countries go for projects with more involved participants from the country (collaboration ~9%), while for majority cases participants from Baltics are included as single country representatives in the projects.

Although Sweden is the most retained (above 3% of EC total contribution) Baltic – Nordic country as the largest one (Worldometer, 2020), other Nordic counties are more successful with respect to EU contribution per capita. Iceland, the smallest country in the sample, has the most successful participants (21%) and the highest EU contribution per capita (338 €). Also, Iceland is the ‘most Baltic – Nordic’ country: 19% of its project partners come from the region. Baltic countries are far behind the Nordic neighbours. However, Estonian success is remarkable – contribution per capita is higher than in UK, France, Spain and Italy.

	DE	UK	FR	ES	IT	NL	BE	SE	DK	FI	NO	EE	IS	LV	LT
DE	9	14	13	12	12	14	12	13	12	13	11	9	9	9	10
UK	10	8	9	9	9	9	8	9	10	7	8	7	9	5	6
FR	11	11	9	11	11	10	10	10	9	10	10	7	9	8	9
ES	10	10	11	9	12	9	10	10	9	10	10	9	6	7	8
IT	10	10	10	11	9	9	9	9	8	9	8	9	8	7	9
NL	7	7	6	6	6	6	8	6	7	6	6	6	5	6	5
BE	5	5	5	5	5	6	4	5	5	5	4	5	4	5	5
SE	4	3	3	3	3	3	3	4	4	4	4	3	4	3	3
DK	2	2	2	2	2	2	2	2	4	2	3	3	3	2	2
FI	2	2	2	2	2	2	2	3	2	4	3	3	3	3	3
NO	2	2	2	2	2	2	2	2	3	2	4	2	5	2	2
EE	0.4	0.4	0.3	0.5	0.5	0.5	0.5	0.5	0.8	0.7	0.6	2	0.7	1	1
IS	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.4	0.3	0.6	0.3	3	0.3	0.2
LV	0.3	0.2	0.3	0.3	0.3	0.4	0.5	0.4	0.5	0.5	0.4	1	0.6	2	1
LT	0.4	0.3	0.4	0.3	0.4	0.4	0.5	0.4	0.5	0.5	0.5	1	0.5	1	1
Total for B–N, %								13	15	14	15	17	19	16	14
H20 application success - 17%	19	17	21	16	15	19	20	17	16	15	18	15	21	15	15
EU contribution, %	15	13	11	9	8	8	5	3.4	2.6	2.2	0.38	0.23	0.15	0.14	
EU contribution per capita, €	1318	95	84	99	70	229	220	171	226	207	207	144	338	41	25

Figure 1. Relative collaboration, success and contribution for selected countries (%). Source: Cordis (2020).

3.2. Excellent science and Enhancement of educational programmes

Projects under Excellent science consolidate research and promote competitiveness on a global scale. The best HES invest efforts for this pillar; however, Baltic universities are seriously lagging behind the Nordic neighbours (Fig. 2). Hereinafter data are provided in percentage of the ‘reference’ projects against the total number of projects.

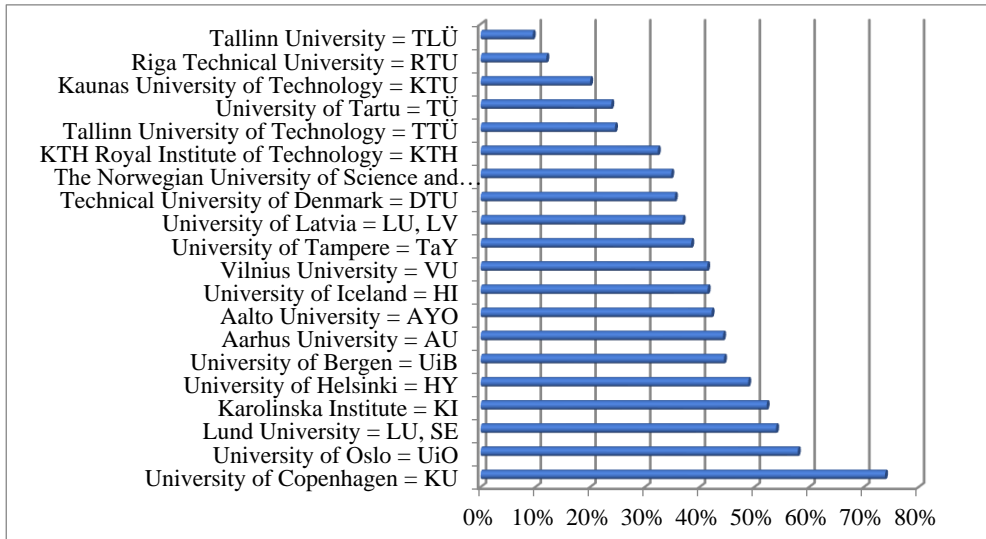


Figure 2. University involvement in Excellent science projects (%). Source: Dashboard (2020).

Horizon 2020 foresees a special activity co-funded with national governments for advancing national/regional/international programmes for Doctorate and Post-doc researchers' training. By early 2020, 87 such projects have been supported (Dashboard, 2020); about a quarter of them have participants from Baltic – Nordic countries (mainly Nordic): Finland – 20, Sweden – 19, Denmark – 7, Iceland and Norway – 2 for each, Estonia – 1. The top-listed universities (Tab. 1) are also the most engaged for this activity. Based on participation intensity in Excellent science projects, it is obvious – Nordic HES have more opportunities for promotion of students' scientific and research education.

3.3. Research and innovation versus Coordination and support activities

Research and innovation projects (RIA) are aimed at development of a new knowledge versus coordination and support actions (CSA), which do not enclose any research activities; therefore, scientists are more interested in the collaborative research. There is no significant difference in the share of research projects among Baltic – Nordic universities (grey bars, Fig. 3). However, when involvement in Excellent science and research projects is aggregated (Fig. 2 and grey bars Fig. 3), Nordic universities are far ahead. Therefore, it could be concluded that scientists (and thus also students) from Baltic universities are less integrated into the European Research Area. The said is reflected also by considerably lower citation index (THE, 2020) for Baltic researchers.

Yet, Baltic participants are thoroughly involved in research supporting activities – CSAs, i.e.: establishment of thematic research networks, conducting of studies, etc. (blue bars, Fig. 3).

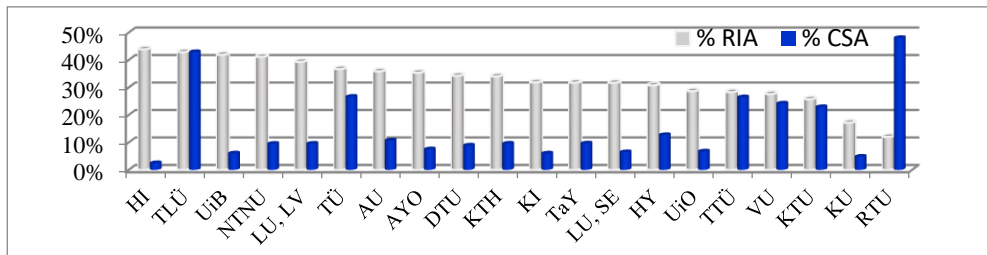


Figure 3. Involvement in research (RIA) and coordination-support (CSA) projects (%). Source: Dashboard (2020)

3.4. Spreading excellence and Widening participation

Estonia, Latvia and Lithuania belong to so called ‘widening countries’ eligible for special Horizon 2020 support actions. The most influential of them are Teaming activities aimed at consummating existing research centres in ‘widening countries’ through coupling with leading European research institutions.

Baltic countries’ efforts have resulted in 2 teaming projects for Latvia (3 universities) and one for Estonia. Two of three Baltic teams have chosen mentors from leading research centres Nordic countries (Tab. 2): here Baltic – Nordic neighbour links work well.

Table 2. Baltic – Nordic Teaming activities

Project	Baltic participants	Nordic participants	Other participants
CAMART ²	Institute of Solid State Physics, University of Latvia, LV	KTH Royal Institute of Technology, SE RISE ACREO, SE RISE Research Institutes of Sweden, SE	
BBCE	Riga Technical University, LV Latvian Institute of Organic Synthesis, LV Riga Stradiņš University, LV		AO Research Institute Davos, CH University of Erlangen- Nuremberg, DE
FINEST TWINS	Tallinn University of Technology, EE Ministry of Economic Affairs and Communications, EE	Aalto University Foundation, FI Forum Virium Helsinki, FI	

Source: Dashboard (2020).

3.5. Doctoral students and Horizon 2020

Doctoral students in science and technology fields for Estonia and Finland are at 0.7% and 1.3% of the 20-29 years aged population (Eurostat, last data from 2012). These countries have improved the performance in comparison to the previous EU research programme (FP7, Dashboard). For example, Estonia accumulated around 0.2% of total FP7 EC contribution, but in Horizon 2020 it has doubled its share (0.38%, Fig. 1). Also, Finland has slightly improved from 1.9% to 2.2%, while Latvia and Lithuania (0.3% doctoral students for both) remain at the previous around 0.1% level. Draft trend: countries with higher Doctoral students’ ratio have higher potential for future growth – a topic for study in Horizon Europe.

There is a correlation between Horizon 2020 funding attributed to one Doctoral (PhD) student and the number of total PhD students enrolled and graduated (Fig. 4). According to Lehman et al. (2013) Spearman’s correlation coefficients are respectively 0.50 (moderate) and 0.68 (strong). One can conclude – a university investing more in research can attract more students and provides more possibilities for research education.

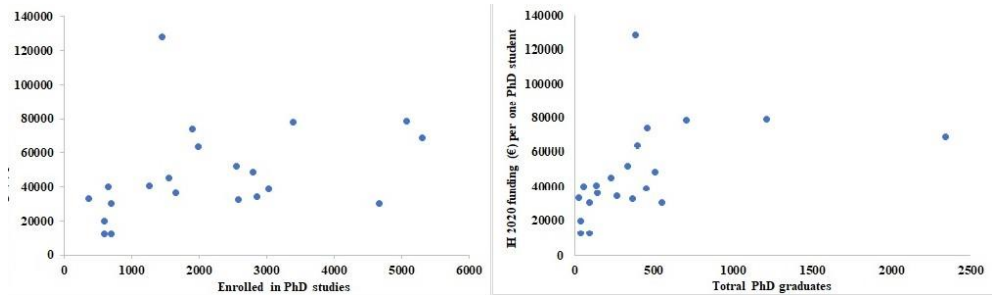


Figure 4. Correlation between Horizon 2020 funding and PhD intensity. Source: ETER & Dashboard (2020).

4. Universities and Sustainable development

The next Horizon Europe programme is aimed at achieving Sustainable development goals (SDG, 2015). Therefore, it is interesting to look how universities cope with these goals today. In 2019 THE has published a ranking focusing on how HES are contributing to the Sustainable development goals. The list reflects 4671 HES performance against SDGs.

Fifteen Baltic – Nordic HES are included, half of them among top-100 (Fig. 5). The best are Swedish universities; from Baltics, only Latvian have submitted data on SDGs. A university’s final overall score is calculated by combining its score for SDG 17 (mandatory) with its top three scores of other SDGs; therefore, all are not assessed against the same SDGs.

It is certainly worth emphasising the University of Gothenburg (Fig. 5, grey highlighted, not included in sample of this paper as ranks 7th for Sweden). Hypothesis: mission based Horizon Europe programme could become a game-changer for university participation.

Rank	Name	Country	SDG3	SDG4	SDG5	SDG8	SDG9	SDG13	SDG16	SDG17
6	University of Gothenburg	SE	8	1	3	101–200		30	38	30
7	KTH Royal Institute of Technology	SE		37	101–200	2	3	9		14
15	University of Helsinki	FI	93	101–200	31	42	90	11	4	9
19	Aalto University	FI	201–300	87	101–200	101–200	10	27	101–200	5
53	University of Bergen	NO	39	201–300	87	101–200	101–200		74	59
75	University of Eastern Finland	FI	81	201–300	101–200	101–200	101–200	101–200	84	101–200
92	University of Latvia	LV	301+	201–300	101–200	32	101–200	97	80	49
97	Aalborg University	DK	77	19	45		34	48		201–300

Figure 5. Baltic – Nordic universities' commitment to SGDs. Source: THE (2020).

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