The Influence of Professional Competencies on Social Sustainability

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Abstract

The universal sustainability approach becomes the main direction when outlining the UN World in 2050 policy tasks. Within this approach, the competencies and skills for front-end innovation are becoming decisive sustainability factors in the future developing society. The simplified multiple criteria assessment methodology based on cobweb diagrams was applied to the regional expert evaluations of innovative HR potential a/o factors determining sustainable modern knowledge development, also comparative interdependencies of education–knowledge- innovation components within the Baltic and Scandinavian States. The task was to evaluate innovative potential of the Nordic countries and reveal how global innovation indicators could be applied as drivers determining their universal sustainability. The practice of Scandinavian countries as innovation leaders could be useful in developing sustainable HR potential for competitive efficiency.

Keywords: Human resource sustainability, innovative competencies, multiple criteria assessment, Scandinavian and Baltic States

Introductory remarks and presumptions

The innovative approach to sustainability of society consists in including not only in the green economy and protection of limited natural resources but also rational balancing of all disposable, especially human, resources in the development. The competencies as a cluster of knowledge, skills, abilities and motivation (Boyd et al., 2017) become those decisive sustainability factors for innovation in the developing society. Not only the frictional unemployment but all required HR potential adequate to innovative technologies and e-management strongly depends on rational social innovation within sustainable economic growth. As different from professional competencies in narrow sense, innovative education development anticipates the special importance of creativity and enterprising, perceiving forecasting and managing effective output changes within universal sustainability concept.

Both sides of the problem are important: innovations impact on sustainability as well as sustainability-driven innovations. Below the first aspect of review, more exactly: the role of innovations on the universal sustainability of development, is prevailing, with accent on education and talents, not on the innovative green economics (waste and emission management) as sustainability factors. It supposes the sophisticated approach to innovative life cycle of human beings as well as products, technologies, services life cycles, their management. The expert evaluations of competency and skills impact on innovation aims to be arranged on basis of multiple criteria and multiparametric assessment methodology for concluding how suitable it is for the regional comparative evaluations of education quality determining sustainable development of modern knowledge society. The criteria of sustainability in HR development are different depending on the scale of approach: the EU level, or one of the countries under review, or firms level, local or international, especially if to evaluate the 4 movement freedoms within the EU, impact and limits of brain drain, dynamic balancing of HR and their skills quality for the future development, also stability of the social pension systems etc.

The attention in this review is given to interdependencies in HR education and knowledge with innovation components within multiple criteria evaluations of the Baltic and some Scandinavia States, incl. SMEs dates. The task is to evaluate how much approbated indicator metrics used by experts for global evaluations and academic ratings could be applied for evaluations of the competencies determining competitive innovativeness of the countries under review, also to detail some rational intersectorial distributing of limited resources for sustainable development of labour and vocational skills. The definition of the global innovation identifies its index (GII) as integrated determinant energizing the world (OECD, 2018) aiming to universal sustainability.

The UN sustainable development goals (SDG) characterise the integrated situation of the universal sustainability by internationally comparative indicators for all 193 UN member states. Their indicators are based on data selected for 169 SDG targets underlying 17 integrated SDG sectors and represent the most reliable situation of universal sustainability at the moment. For the comparison of the Nordic countries, we selected 10 most specific (peculiar) SDG sectors revealing that indicators for some of them are within a narrow interval but for some, as reduced inequalities and innovation infrastructure, they have rather wide differences (Table 1).

Table 1. The SDG Index and its components for selected countries, 2018

Selected indicators from basic sectors*, by countries	Denmark	Finland	Norway	Sweden	Estonia	Latvia	Lithuania
The SDG aggregated index	85.2	82.8	80.7	85	80.2	77.1	75.1
End poverty (after taxes and transfers, population)	99.6	99.8	99.5	99	99.7	98.7	98.4
Good health and well-being	96.1	96.2	97.9	97.8	88.8	84.5	84.6
Quality education (%)	98.3	98.9	99.9	99.3	95.3	95.7	98.7
Affordable and clean energy**	93.6	96.4	98.6	98.7	88.9	91.2	83.5
Decent work, employment, training (%)	83.9	82.5	78.5	83.5	84.8	83.3	80.5
Gap in innovation infrastructure***	88.1	83.7	80	91.7	61.5	49.3	45.4
Reduced inequalities****	96.5	97.9	100	100	72.2	76.5	49.6
Peace, justice, freedom*****	92.8	92.9	84.9	83.8	87.8	77	80.5
Partnerships for the goals******	89.8	74	99.6	98.2	55.5	50.4	51.6

Selected from: Sustainable Development Report 2019, p.49-57, 67-69. *As a basis, compound annual growth rates used. For selected indicators, expert evaluations from the adequate group, 2010-2018. So, End poverty rate included poverty line 50%, also % of population living under the poverty thresholds; Good health included Life expectancy at birth, various fertility, births, mortality and death rates. **incl. renewable, in total final energy consumption (%). *** Internet access, education, R&D expenditures (%)****Gini Coefficient adjusted for top income (1-100). *****Incl. homicides, property rights, corruption perception, press freedom (0-100). ****** Incl. government health and education spending (% GDP).

The Scandinavian States are leading within all UN member states (193) by most of socio-economic surrounding parameters characterising the transformations aiming to the UN SDG (Denmark - 1, Sweden -2, Finland – 3, Norway - 8) and the Baltic States (Estonia – 10, Latvia – 24, and Lithuania - 32) are in comparatively high positions (*Sustainable, 2019,* p. 16-17, 20-21). The most wide differences between both groups of countries are in Reduced inequalities (from 49.6 in Lithuania till 100 points for Norway and Sweden), Innovation infrastructure (from 45.4 in Lithuania till 91.7 points for Sweden) and Partnership for the goals (from 50.4 in Latvia till 99.6 points for Norway) reveal these problemic sectors blocking a move to the universal sustainability aims by the Baltic States (Figure 1). Less relief differences mostly determined by ethnic tensions are fixed in Peace, justice, freedom (Latvia – 77 points, Denmark and Finland – 92.8-92.9).

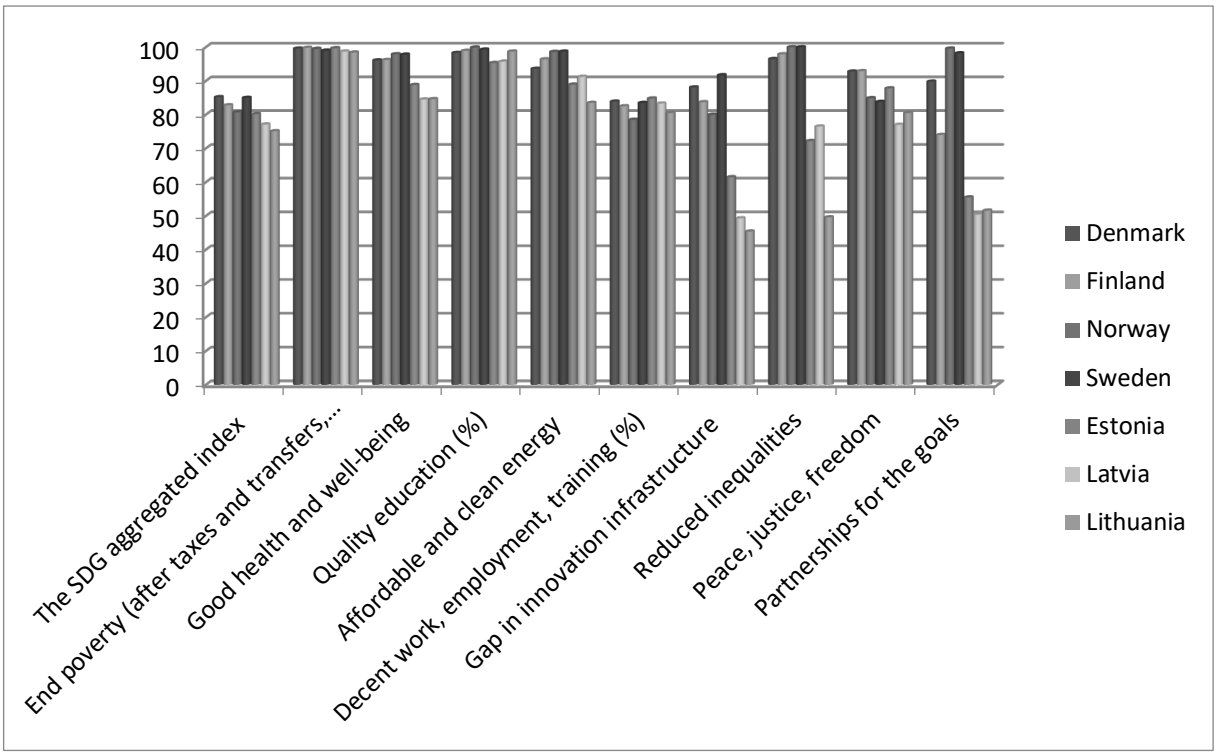

Figure 1. SDG basic sectors by selected Nordic countries

There are specific educational or managerial competencies encouraging sustainable innovations, as preservation of new ideas, broadening of knowledge and skills, stimulating and managing creativity (its resources etc.: Epstein, 2010). The international data on core competencies of the INSEAD experts included the determinants interconnected with professional abilities, learning quality and innovativeness of both education and product, services or process innovations, with leadership, abilities to improve performance etc. (UNDP, 2016). The factors determining the competencies and innovative activity are interconnected. Competitive globalisation generated the core competency orientation to permanent learning abilities of the employees participating in their direct activity, their initiative and "soft" skills such as communication and teamwork, also entrepreneurship skills and readiness to evaluate the risk (OECD, 2017). At the same time, the innovation-oriented institution managing competitive HR policy usually evaluates its real and perspective learning needs and abilities to enlarge the professional competencies, provide adequate information, use ICT nets and smart AI opportunities, evaluate expected financial benefits a/o determinants of universal sustainability. Together with the INSEAD (2018) and WIPO experts, we will try to ask - How should one better measure innovation and intangible assets in the services sector? How can linkages between innovation actors be better quantified and assessed?

The prevailing innovation indicators are substantially determined by entrepreneurship competencies and productive innovativeness, determined by quality of education and special professional practice, development of innovative business incubators, also promoting start-ups, tertiary enrollment rate, etc. At the same time, the range of comparative indicators of EU innovation performance presented by/for expert evaluations, is clearly insufficient. So, HR are

characterised just by completed education, incl. tertiary, also *Lifelong learning*, by *New doctorate graduates*, and any other professional competencies are not measured statistically. Besides, some additional qualifications of HR are added when presenting intellectual assets and research systems indicators, such as *PCT patent and trademark applications*, *International scientific co-publications*, *Most-cited publications*, but they are attributable only to narrow group of scientists. The methodology applied for estimating expected change, just linear regression on basis of 2011-2017 (EIS, 2019, p. 38), is also rather primitive solution determined by insufficient disposable data of expert evaluations. It is difficult to imagine, how evaluation of Human resources in Scandinavian countries can surpass the EU-28 level 1.5-1.8 time. Intellectual assets are characterised just by PCT (Patent Co-operation Treaty) applications, Trademark and Design applications, not including such assets as widely used international Data basis and ICT nets.

The key emerging bottleneck for the development of a knowledge-intensive business sector is the employment impact characterised by the availability of skilled human resources for innovation creation. It is interesting to find that employment in high- and medium high-technology manufacturing sectors in EU-28 as share of total employment was much higher (5.8 %) than in any selected Scandinavian or Baltic state (Table 2). Besides, the respective employment share in Estonia (4.1 %) was higher than in Norway (2.5 %). Respectively, employment in knowledge-intensive service sectors in EU-28 was 4 %, i.e. lower than in most selected Scandinavian countries (except Norway) and Estonia (5.4 %). The surpassing development strategy of HR activities into knowledge-intensive service has added a positive impact when creating the favorable conditions and competitive environment to Northern European countries.

Table 2. Employment rates in high-technology manufacturing and knowledge-intensive service, 2018, %.

Groups of selected countries, % of total employment	High- and medium high-technology manufacturing	Technology and knowledge-intensive service
EU-28	5.8	4
Scandinavia		
Denmark	4.8	5.5
Finland	4.8	5.6
Norway	2.5	3.9
Sweden	4.3	4.8
Baltics		
Estonia	4.1	5.4
Latvia	1.6	3.1
Lithuania	2.2	2.5

Source: Eurostat, 2019. Retrieved from: https://ec.europa.eu/eurostat/databrowser/view/tsc00011/ default/table?lang=en

However, the statistics of the INSEAD experts on employment in knowledge-intensive activities (Fig. 1) and in fast-growing enterprises of innovative sectors (Fig. 2) and is slightly different perhaps as result of more sophisticated evaluations of measured determinants for selected countries and shows prevailing priorities of Scandinavian countries (except Estonia and Norway; comparative data on it not presented).

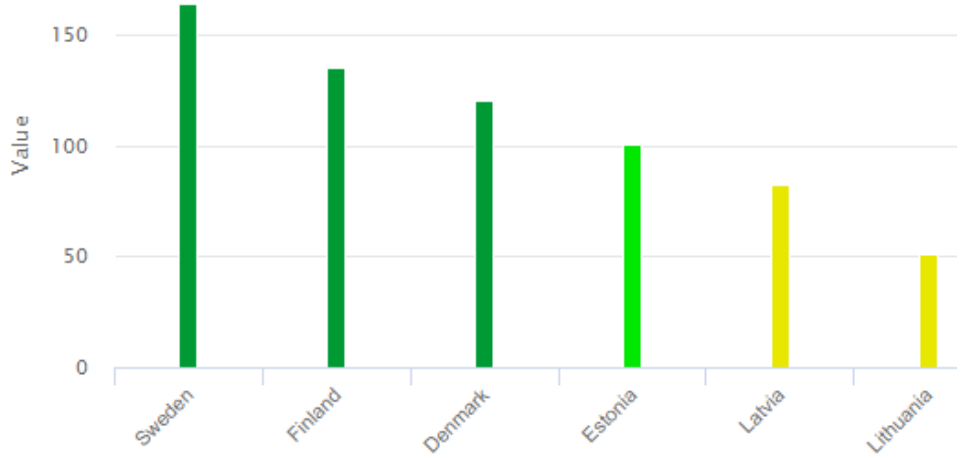

Fig. 2. Employment in knowledge-intensive activities in selected countries by their innovativeness, 2018

Source: the INSEAD expert evaluations, EU=100. European Innovation Scoreboard 2019.

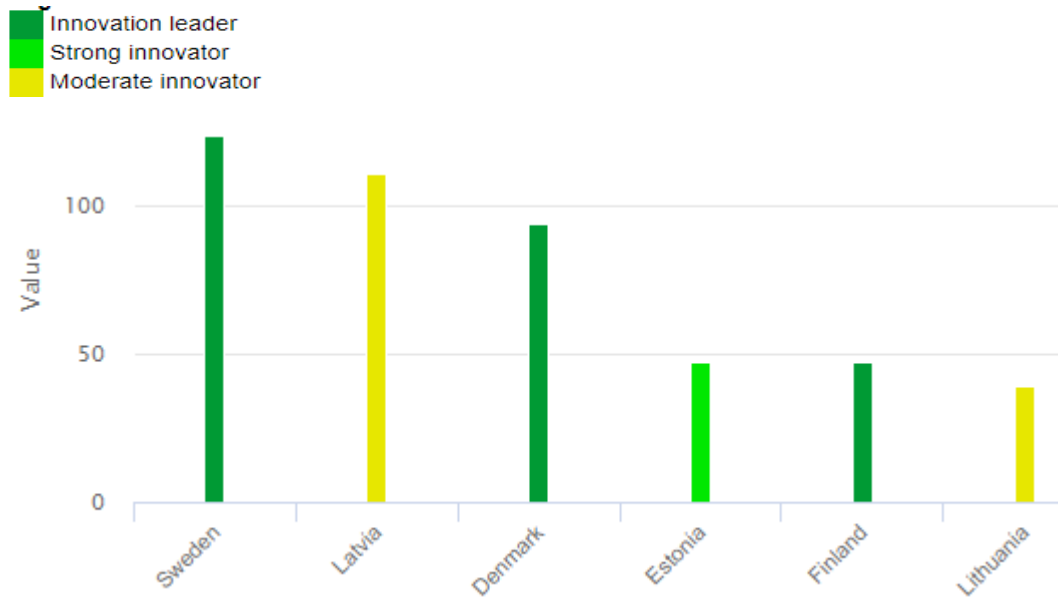

Figure 3. Employment in fast-growing enterprises of innovative sectors in selected countries by their innovativeness, 2018.

Source: the INSEAD expert evaluations, EU=100. European Innovation Scoreboard 2019

In 2014-2020, the Baltic States applied smart specialisation strategy oriented to the innovative tasks affecting higher education, innovative specialisation priorities, wide e-orientation with help of modern ICT infrastructure(content development technologies, ICT interoperability and infrastructure, cloud computing solutions and services), some of them with account of achievements in programmed measures of Scandinavian countries. The top companies in the countries under review raised their R&D expenditures within this period.

The sustainable innovation developments are characterised by total factor productivity depending of such important indicators as innovative technologies applied, or innovative products or services produced and/or exported, as expected result of patents, publications or royalties per personnel (head). They are related with the overall level of education, the quality of the education system, personnel training and retraining, professional management adequacy, encouraging creativity. The relationship between rewards and performance stability, the country's ability to attract talents from elsewhere and keep their own, mathematics a/o science subjects teaching quality are also important (Chen, 2016; WEF, 2016). Some of the data characterising the impact of ICT, digital nets and e-education (based on formalised teaching with the help of electronic resources) on competencies and innovations could be received mostly by special review or expert evaluations. P. ex., the problematic factors for doing business in Lithuania and Latvia (besides inefficient government bureaucracy and taxation) are the inadequately educated workforce, insufficient capacity to innovate, and some managerial achievements in education systems of Scandinavian states are earning necessary attention.

This review was based on annual reports concerning feasibility of global indicators for evaluating sustainable impact of HR competencies and innovations used by the WBG, WEF, INSEAD, WIPO etc. experts, such as Network Readiness Index (NRI), Global Innovation Index (GII), Global Talent Competitiveness Index (GTCI) (INSEAD, 2018, 2017; EIS, 2018). They revealed that the input and output of global innovations is dependent of employable (or labour) and vocational skills (LV), and global knowledge (professional, managerial or leadership - GK) skills developing with perspective tasks of universal sustainability in one or other country.

The *purpose* of this review is to reveal some sustainability aspects by evaluating the comparative interrelations between regional education and integrative innovation macro parameters in Scandinavian and Baltic economics. The research *methods applied* include multicriteria approach on the basis of the Eurostat system of social and economic parameters characterising comparative international evaluation of innovative impact on the sustainable growth of the countries under review.

The *object* of the paper is impact of innovative HR development characterised by education, competency and skills parameters on universal sustainability. The information to be used was presented in the international evaluations of state innovative activity, competitiveness, macroeconomic growth. So, the *originality* of research consists not in prevailing sustainability-driven innovations oriented mostly to green technologies. As the research revealed, the core innovation determinants applied in the international evaluations of sustainable

macroeconomic development do not detail some sophisticated aspects determining the impact of professional competencies on innovativeness of business and education. As a result, they do not suggest the most rational solutions for the competitive and innovative education and/ or business policy in the selected country as well as do not assess the lifestyle differences and specific needs resulting from deep social differentiation and can result in some unsustainability effects. The review of multiparametric cobweb interactions revealed the criterial inadequacy of competence parameters used by international experts for some sustainable evaluations of innovation processes (Franceschi, 2016; INSEAD, 2017; WEF, 2019).

HR innovation parameters as universal sustainability determinants: Baltic and Scandinavian States

HR innovation starts with education and continues with abilities and competencies to create new products, technologies, services, with managerial success to realise productively them and, finally, to export them. In the Scandinavian States as innovation leaders, and Estonia (attributed to strong innovators), most of registered education parameters are substantially higher than average levels of the EU. Latvia and Lithuania are attributed to group of moderate innovators, and their efficiency of HR innovation is much more problematic. This is the only necessary presumption of sustainable innovative development. Most difficult tasks are to educate new talents which would be able to produce efficient innovations and widespread them.

The comparative socio-economic surrounding of innovative performance in Scandinavian and Baltic States, 2011-2017, characterized by selected determinants in the Table 3.

Table 3. Socio-economic surrounding of innovative performance in Scandinavian and Baltic States, 2011-2017, by selected determinants

Selected indicators, by countries	EU-28	Denmark	Finland	Norway	Sweden	Estonia	Latvia	Lithuania
GDP per capita (PPS)	29500	37400	32100	43900	36100	22700	19100	22400
Gross domestic expenditure on R&D, % of GDP	2.58	3.05	2.76	...	3.4	1.29	0.51	0.89
Employment share manufacturing, %	15.5	11.8	13.4	8.3	10.3	18.9	13.4	15.4
Employment share, high-tech of all manufacturing, %	37.5	42.9	36.1	34.2	42.5	20.2	12.4	13.8
Employment share in services, %	41.8	41.4	40	38.7	41.3	40.1	41.7	39.6

Employment share, knowledge-intensive services of all services, %	35.0	34.8	39.3	38.4	44	31.3	29.3	24.3
Turnover share, SMEs, %	37.9	40.7	40.1	38.2	38.4	48.2	51.6	48.9
Turnover share, large enterprises, %	44.4	40.7	44.3	39.2	43	22.3	22.3	32.8
Share of value added in foreign-controlled enterprises, %	12,6	10.6	9.5	13.7	13.5	13.5	14.1	11.5
FDI net inflows, % GDP	4.3	1.3	4.9	-0.9	3	2.3	2.6	2.4
Buyer sophistication (1 to 7 best)	3.7	3.7	4.6	4.5	4.6	3.5	2.9	3.2
Ease of starting a business (0 to 100 best)	76.8	84	80.4	82.3	81.1	80.4	79.3	79.5
Basic-school entrepreneurship education and training (1 to 5 best)	1.9	…	2.4	2.4	2.4	2.9	2.5	,,,
Tertiary educational attainment (% of population aged 30-34)	47.0	49.1	44.2	,,,	52	47.2	42.7	57.6
Govt. procurement of advanced tech products (1 to 7 best) *	3.5	3.5	3.9	4.1	4	3.7	2.9	3
Rule of law (-2.5 to 2.5 best) **	1.2	1.9	2	2	2	1.3	0.9	1

Selected from: European Innovation Scoreboard 2019, p.46, 48,56-57, 68-69,74. * The extent to which government procurement decisions foster technological innovation. Trust is important for creating a business environment for undertaking risky innovative activities. **The differences in the extent to which people have confidence in and abide by the rules of society; it measures differences in the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

Under much lower GDP per capita in Baltic States (about ½ of Scandinavian level) and Gross domestic expenditure on R&D, % of GDP (2-6 times), they have similar employment share in services and in knowledge-intensive services, but much less in high-tech of all manufacturing (%).

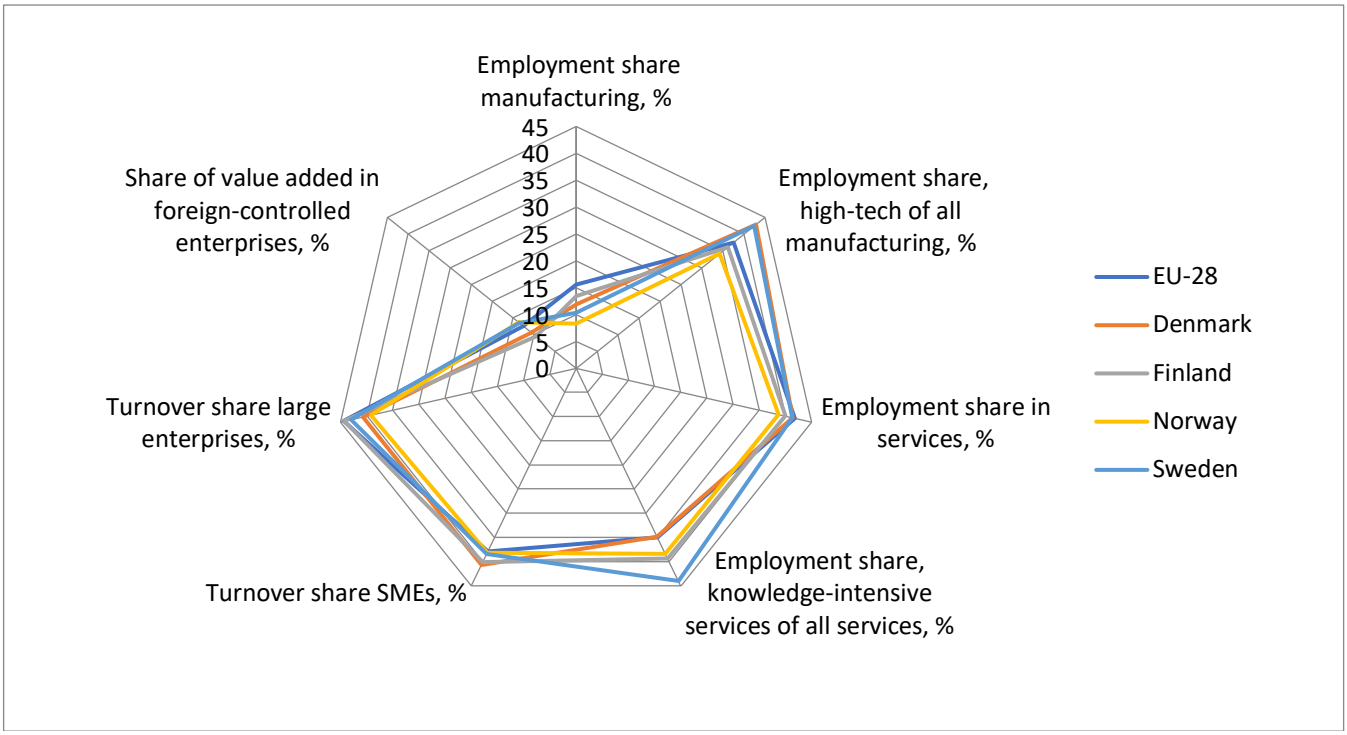

Figure 4. Selected innovative performance indices, by Scandinavian countries, 2018

The more substantial differences can be also mentioned in Turnover share of large and SMEs in both groups of countries. Other surrounding parameters are fluctuating in different countries and do not show substantial differences determining their uneven innovative effect (Fig. 4-5).

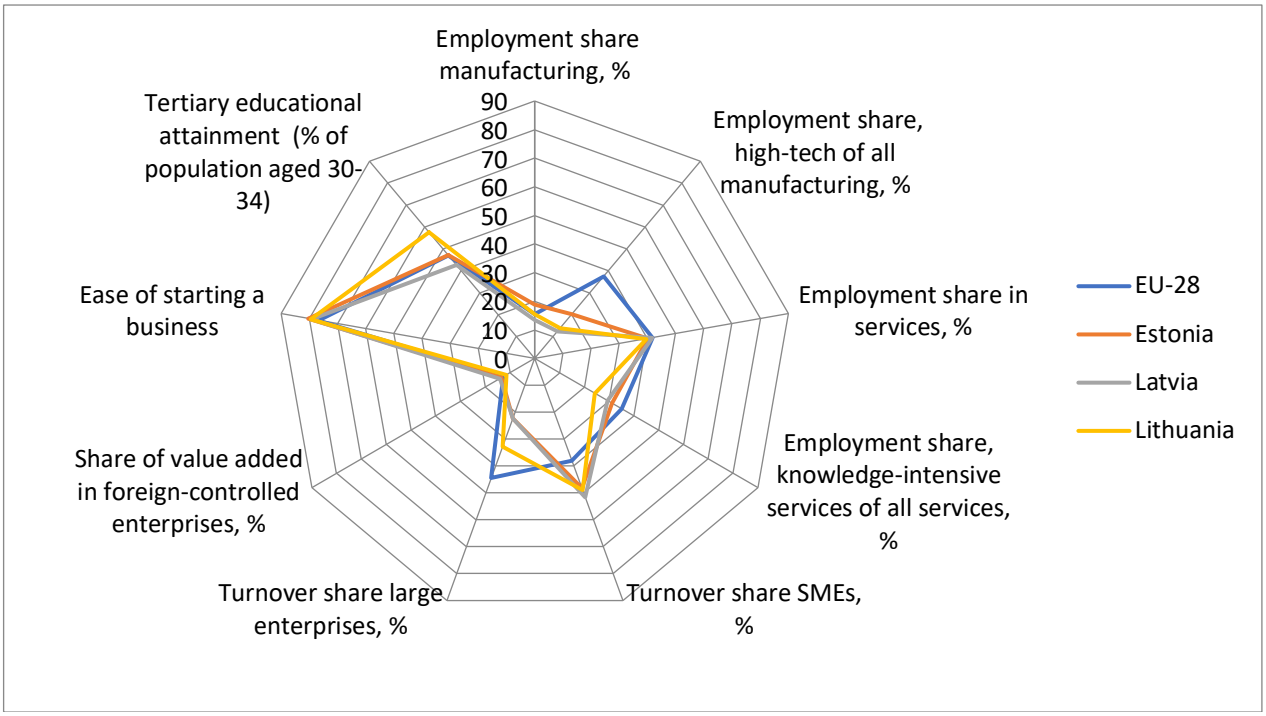

Figure 5. Selected innovative performance indices, by Baltic countries, 2018

The main type of training in the EU is non-formal with high level of educational achievement (3/5 with tertiary levels). The Scandinavian states and Estonia have evidently higher levels than EU average, in all selected countries the training of women outperforms the comparative levels for men. Latvia and especially Lithuania are lagging below EU average especially by training and lower secondary education. The part of graduate education professionals working in highly innovative workplaces also show the specific distribution of Northern European countries: Finland and Lithuania were somewhat higher than the selected Europe-19 country mean, Norway and Estonia – lower (*EU Community Innovation Survey, 2016*).

It is important to identify and compare the main obstacles not permitting youngsters to participate in the education and training. They are different in all compared groups but no access to computer or internet is between minor obstacles (for distant learning). The most wide group of selected data identified the low motivation to continue education as the main obstacle, based on the conviction that there is no need for that (some expected to continue by individual ways of learning). Latvia, Lithuania and Sweden are leading by about twice more passive drive to motivation comparing with average for the EU, low initiative of less educated people. The lowest part of people not feeling the need to continue study is in Norway and Finland. The conflict with work schedule was second group of obstacles by their significance level (especially in Finland), the significant obstacle was family matters.

The widespread of tertiary and lifelong education is especially important for stable supporting of the sustainable HR development in the future. The comparative evaluation of Northern European and Baltic States presented in Fig.6, shows much higher levels of lifelong learning in all Scandinavian countries, and % of female participating in all countries is higher than % of males.

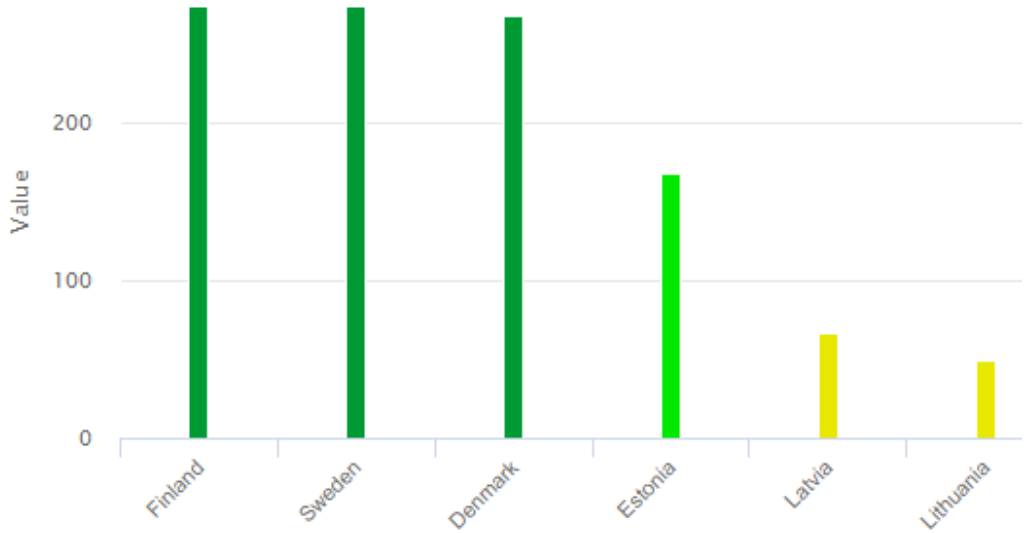

Figure 6. Life-long education in selected countries by their innovativeness, 2018
Source: the INSEAD expert evaluations, *European Innovation Scoreboard 2019*.

The INSEAD evaluations show the more even situation concerning completed tertiary education (Fig. 7): best achievements are in Lithuania (above of the EU average), and Finland has the lowest level between countries under review.

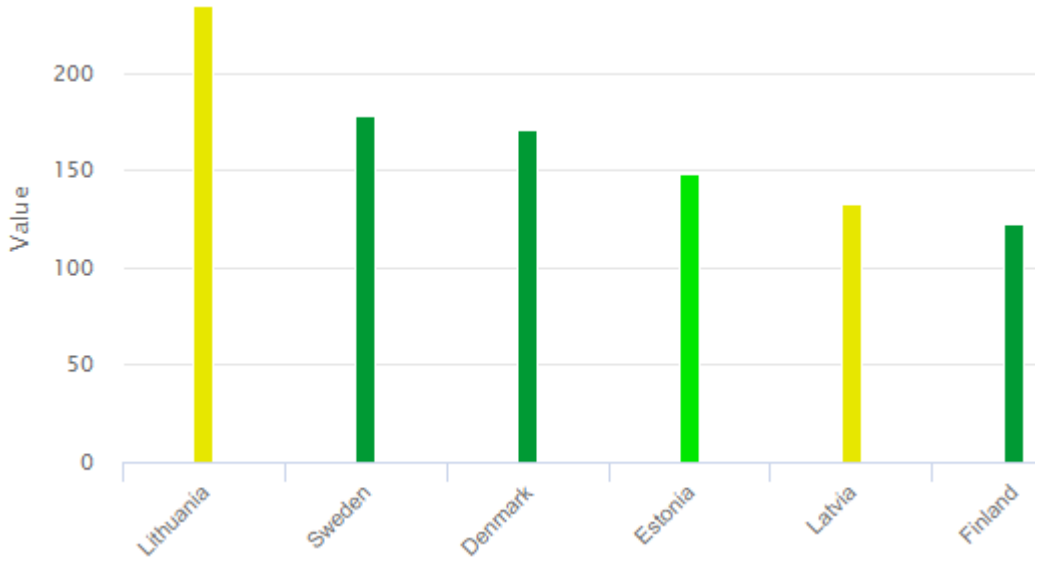

Figure 7. Population completed tertiary education in selected countries by their innovativeness, 2018

Source: the INSEAD expert evaluations, *European Innovation Scoreboard 2019*.

The review of innovative workplaces by activity sectors shown that their percentage in Lithuania, Estonia and Norway was nearly similar in the education sector (much higher in Finland) and higher than the selected Europe countries mean. In most of selected Northern European countries, manufacturing was leading sector by innovative workplaces except Lithuanian health sector where % of working graduates was highest. However, the survey statistics of special researches on EU graduates in the innovative workplaces are published only from time to time, and it is difficult to evaluate the newest changes and specific peculiarities when comparing the participation rates important for evaluation of education quality and professional orientation. Some previous surveys shown that between 2005 and 2015, the situation in Sweden detectably ameliorated, also Estonia, Latvia and Lithuania are near the EU average and slowly ameliorating its indicators (all Baltic States are nearly or achieved average 80 % of employment as target for 2020). The level of employment in resent young graduates was insignificantly slump only in Finland (Eurostat, 2018).

The statistical data of Eurostat also revealed that last 5 years the early leavers from education and training amounted to about 11-12 % of the EU population aged 18–24. The comparative view of early leavers what characterises additionally does their knowledge motivation and their interests to ameliorate their situation in the future are strong enough. First-of-all, the national targets for ameliorating this indicator for Europe 2020 are different; the levels in Sweden, Lithuania and Denmark are much below both national and EU-28 targets, they slowly ameliorated with diminishing % of leavers and Latvia just achieved the EU and national target

levels. Only in Estonia the part of early leavers from education and training not declined and was higher of national target. The comparison of the young employed people with motivation to work in the EU-28 reveals some potential possibilities of more rational learning stimulus reorientation. About 2/5 of young leavers in the EU average wanted to work and about the same part are employed (both groups in Finland, Sweden, Estonia and Latvia amount even more than 2/3), and the part of youngsters not wanting to work is only in Lithuania about half. In EU-28 and Scandinavian countries, part of young woman leavers was 1/3-1/4 less than part of young men, in Estonia and Latvia it was near ½ less. The young men leavers in most of selected countries would like to work, but their % was less than in the EU-28 (except Latvia).

The levels of education professionals by innovation knowledge type or methods in the innovative workplaces Finland (67.2 %), Lithuania (64.6) and Norway (61.8) was substantially higher than EU mean level (58.9) and Estonia – lower (51.4 %). But by output of innovative products or services the situation was reverse– both Lithuania (30.9 %), Norway (32.9) and Estonia (36.4) were lower than European country mean (37.6), when comparative data for Finland were higher (44.2 %). By technology or tools used both Lithuanian and Estonian education professionals in highly innovative workplaces were on higher levels (45.3 and 44.3 %) than European country mean (36.4 %), Norway and Finland were below the EU mean (adequately 25.5 and 32.7 %). The levels of graduate professionals in manufacturing sector and business activities were much higher in Norway and Finland.

The Eurostat data presented above are rather important for comparative evaluation of main trends in education and training, according to manpower demand changes and traditions of international division of productive activities in the EU. They are at least not sufficient for detailed recommendations of the ameliorating the education policy according to perspective aims of national development within Baltic countries with urgent needs of continuing European economic integration and consequent specialisation. However, they are significant for the multiple criterial evaluation of EU and national HR sustainable development criteria and, at last, modelling of universal sustainability at macro level.

The innovation performance oriented for universal sustainability in the Baltic and Scandinavian States

The impact of innovative performance on the development and sustainability of the countries are best characterized by integrated, or composite, indices, their system prepared by joint Maastricht Economic and Social Research Institute on Innovation and Technology group and results published for the countries under review as European Innovation Scoreboard 2019 are presented in the Table 3. The presented composite indices reveal some important directions of Scandinavian countries mostly surpassing Latvia and Lithuania by Summary composite innovation index (1.3-2.2 times), first-of-all: Human resources indicators (1.8-3 times), Attractive research systems (3.5-4.4 times), Intellectual assets (3-3.2 times, except Norway), Innovation-friendly environment (1.5-2 times).

Table 4. Composite innovative performance indices of Scandinavian and Baltic States, 2018, relative to EU-28, by selected indices

Selected indicators, by countries	Denmark	Finland	Norway	Sweden	Estonia	Latvia	Lithuania
Summary composite innovation index*	129.5	134	117.4	135.8	95.3	60.3	74.5
Human resources	180.4	157	143	174.9	109.7	63	94.6
Attractive research systems	183.8	135.4	139.9	166.2	94.4	41	37.3
Innovation-friendly environment**	182.3	182.3	143.8	172.3	87.9	90.9	121
Finance and support	106.7	113.6	116.1	109.3	88.5	97.4	51.4
Firm investments	104.5	129.8	114.9	124.3	90.6	46.4	76.6
Innovators	95.7	168.2	179.7	115.4	107.6	39.7	110.4
Linkages***	139.2	152	157.5	147.3	121.2	48	106.9
Intellectual assets****	163.8	151.8	58	156.2	127.8	53.5	51.3
Employment impacts*****	100.7	80.2	79	134.5	66.4	94.4	42.5
Sales impacts on innovative export******	75.3	85.4	51.7	88	65.6	53.9	55

Selected from: European Innovation Scoreboard 2019, p.9, 46, 48,56-57, 68-69,74. * Calculated as the unweighted average of the re-scaled scores for all indicators where all indicators receive the same weight. ** Innovation-friendly environment captures the environment in which enterprises operate and includes two indicators, Broadband penetration among enterprises and Opportunity-driven entrepreneurship. *** Linkages includes indicators measuring innovation capabilities by looking at collaboration efforts between innovating firms, research collaboration between the private and public sector, and the extent to which the private sector finances public R&D activities. *** *Includes different forms of Intellectual property rights generated in the innovation process, such as PCT applications, Trademark applications and Design applications. ***** Includes indicators measuring Employment in knowledge-intensive activities and Employment in fast-growing firms in innovative sectors. ****** Includes indicators measuring Exports of medium and high-tech products, Exports of knowledge-intensive services and Sales due to innovation activities.

There are some differences, p. ex., by Innovators and Linkages indices only Latvia is lagging behind of Finland (3-4 times) and Norway (3-4.5 times). Estonia and Lithuania are below of Scandinavian countries (except Denmark) by these indicators (Innovators and Linkages) but surpassing ES-28 average. By Intellectual assets index, Norway, Latvia and Lithuania are nearly the half of EU-28 level what is partly determined by specifics of selected indicators included into composite index. The levels of some other selected composite indices also require to be weighed more correctly selecting primary indicators. The comparative view of all composite indices for both groups of countries is presented also in Fig. 8.

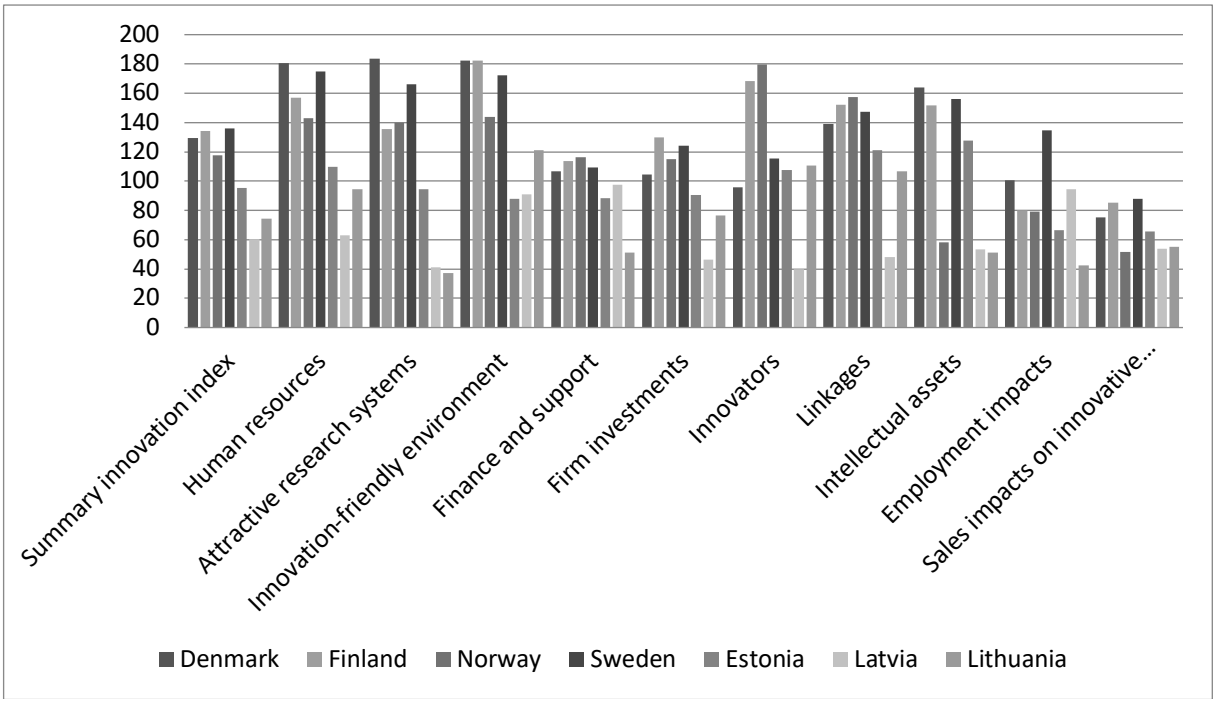

Fig. 8. Aggregated innovative performance indices of Scandinavian and Baltic States, 2018, relative to EU-28

Detailed values of selected innovative performance indices of Scandinavian and Baltic States, relative to EU, are presented in Table 5. They show nor only the advantages of Scandinavian States comparing with EU-28 and Baltic States but also uneven progress of the last group countries in mostly parameters aiming to achieve first-of-all the EU average level.

Table 5. Innovative performance indices of Scandinavian and Baltic States, 2018, relative to EU

Selected indicators, by countries	Denmark	Finland	Norway	Sweden	Estonia	Latvia	Lithuania
Summary innovation index	129.5	134	117.4	135.8	95.3	60.3	74.5
R&D expenditure in the public sector*	174.7	152.5	164.6	158.5	96	37.4	77.8
R&D expenditure in the business sector*	145.7	133	80.5	179.4	43.8	8.6	22.1
Non-R&D innovation expenditures**	45.3	88.9	83.3	92.4	176.1	90.4	176.1
Population with tertiary education	143.1	102.5	155	149.4	124.4	111.3	196.3
Lifelong learning	262.2	268.4	191.8	268.4	164.3	65.3	49
Most cited publications	143.5	112.8	105.9	121	85.2	37.8	35

Foreign doctorate students***	174	107.8	101.3	173.7	63	47.8	21.9
Opportunity-driven entrepreneurship****	187	187	149.1	166.6	86.9	87.2	67.1
Venture capital expenditures*	49.1	80.6	75	67.5	82.1	148.2	29
Enterprises providing ICT training*****	126.3	168.4	178.9	105.3	47.4	36.8	26.3
SMEs product/process innovations, %	96.1	174.9	174.9	115.1	126.5	41	113.4
SMEs marketing/organisation innovations, %	114.2	136.6	173.3	102.8	39.3	43.4	91
SMEs innovating in-house, %	77.5	191.1	191.1	127.8	152.4	34.8	125.9
Innovative SMEs collaborating with others, % of SME	109.8	189.1	192.2	112.8	203.6	43.1	145.7
Private co-funding of public R&D exp.*	70.5	95.3	92.5	87.4	84.2	64.5	122.4
PCT patent application/Bln GDP (PPS)	175.1	219.4	102.2	234	36.6	17.4	16
Employment in knowledge-intensive activities, %	110.6	123.5	114.1	150.6	91.8	75.3	47.1
Medium and high-tech product exports, %	79.8	67.5	…	94.9	55.3	45.4	48.3
Knowledge-intensive services exports, %	112.8	106.6	115.4	106.2	63.7	66.8	10.7
Sales of new-to-market/firm innovations**	23.7	83.1	41.9	56.6	81.6	49.5	117.9

Selected from: European Innovation Scoreboard 2019, p.46, 48,56-57, 68-69,74.*% of GDP. ** % of turnover of all enterprises. *** % of all doctorate students.**** Ratio between the share of persons involved in improvement-driven entrepreneurship and the share of persons involved in necessity-driven entrepreneurship. ******The share of enterprises providing training in respect as a proxy for the overall skills of employees.

The deepest differences between both groups of countries are determined by their economic potential setting differences in their R&D expenditure in the public (1.7-4.5 times) and especially, in business (for Latvia just 8.6% comparing with 179% in Sweden to the EU level, by % of GDP/PPS) sectors. They substantially determined the differences between both groups in Lifelong learning (up to 4-5.5 times in Latvia and Lithuania comparing with Scandinavians; but Estonia achieved 1.6 times higher level to EU-28), PCT patent application

(up to 6-12 times), Enterprises providing ICT training (4-7 times), Most cited publications (1.2-4 times), Foreign doctorate students (1.6-8 times) a/o.

By SMEs product/process innovations, Estonia and Lithuania surpassed the EU-28 level but are much below the levels of Finland and Norway. Different situation is at SMEs marketing/organisation innovations level where Estonia and Latvia are substantially below the EU-28 level (just Lithuania -91%), Finland (137%) and Norway (173%) – above it. Also, most of selected countries are above the EU-28 by SMEs innovating in-house (except Denmark – 78% and Latvia – 35%) but all (except Lithuania– 118%) are substantially below the EU-28 by Sales of new-to-market/firm innovations and by Medium and high-tech product exports, %. By Innovative SMEs collaborating with others, most of selected countries both groups achieved levels exceeding the EU-28 (Estonia, Finland and Norway – about twice) except Latvia (43%). All Baltic States are below the EU-28 level by Employment in knowledge-intensive activities (Lithuania – 47 %) and selected of Scandinavian States – above this level (Sweden -1.5 times).

This review of innovative performance indices revealed strong and weak sides of socioeconomic systems of selected countries and necessary changes, especially in the Baltic States, to strengthen some particular innovation factors determining universal sustainable development.

Some specific features following from this comparative expert evaluation for the Scandinavian States are mentioned below. Denmark's lowest indicator scores comprise Sales of new-to-market and new-to-firm product innovations, Non-R&D innovation expenditures, and Venture capital expenditure. In Finland, Performance on Lifelong learning, PCT patent applications, and International scientific co-publications is well above the EU average. Employment impacts and Sales impacts are the weakest innovation dimensions. Finland's lowest indicator scores are on Employment fast-growing enterprises of innovative sectors, Medium and high-tech product exports, and Venture capital expenditures. In Sweden, Human resources, Innovation-friendly environment and Attractive research systems are the strongest innovation dimensions. It scores high on Public-private co-publications, Lifelong learning, and International scientific co-publications. Sales impact is the weakest innovation dimension. Low-scoring indicators include Sales of new to-market and new-to-firm product innovations, Venture capital expenditures, and Private co-funding of public R&D expenditure. Norway performs well on International scientific co-publications, Public-private co-publications, and Innovative SMEs collaborating with others. Sales impacts, Intellectual assets and Employment impacts are the weakest innovation dimensions. Norway's lowest indicator scores are on Medium and high-tech product exports, Design applications, and Sales of new-to-market and new-to-firm product innovations. Most of Norway's economic indicators tend to be close to the EU average. Notable exceptions are GDP per capita, which is well above the EU average, and enterprise births and FDI net inflows, which are well below the EU average.

Among the Baltic States, Estonia scores high on Innovative SMEs collaborating with others, Trademark applications, and Non-R&D innovation expenditures. Sales impacts and

Employment impacts are the weakest innovation dimensions. Low-scoring indicators include PCT patent applications, SMEs with marketing or organisational innovations, and R&D expenditures in the business sector. Latvia Performance is relatively high for Venture capital expenditures, Population with tertiary education, and Employment fast-growing enterprises of innovative sectors. Innovators, Attractive research systems and Firm investments are the weakest innovation dimensions. Latvia's lowest indicator scores are on R&D expenditure in the business sector, PCT patent applications, and New doctorate graduates. The turnover share of SMEs, and total entrepreneurial activity are all well above the EU average. Indicators well below the EU average include GDP per capita, the employment share in high and medium high-tech manufacturing. In Lithuania, Innovation-friendly environment, Innovators and Linkages are the strongest innovation dimensions. Lithuania scores high on Population with tertiary education, Non-R&D innovation expenditures and Broadband penetration. Attractive research systems, Employment impacts and Intellectual assets are the weakest innovation dimensions. Low-scoring indicators include Knowledge-intensive services exports, PCT patent applications and Public-private co-publications. Many economic indicators are well below the EU average, including the employment share in high and medium high-tech manufacturing, the employment share in knowledge intensive services, the turnover share of large enterprises, FDI net inflows, and top R&D spending enterprises.

More detailed comparative indices of HR and education development for the Baltic and selected Scandinavian States are presented in the Fig. 9-12 based on INSEAD (2017, 2018) and European Innovation Scoreboard (2019) expert evaluations. The comparative analysis of HR and education development revealed that Baltic States are significantly below the Scandinavian levels by Formal education, Vocational enrolment (Finland is leader), International students (Norway is leader) and Relevance of education system to the economy, also by R&D expenditures (together with Norway). Lithuania performs below the average of the EU for most dimensions, except for Human resources (HR), also Finance and support. Relatively worst performing indicators are: Public-private co-publications, NonEU doctorate students, License and patent revenues from abroad, PCT patent applications in societal challenges, and PCT patent applications. Performance above average is observed for such evaluations as: Non-R&D innovation expenditures, Population with completed tertiary education, Venture capital investments and Youth with upper secondary level education.

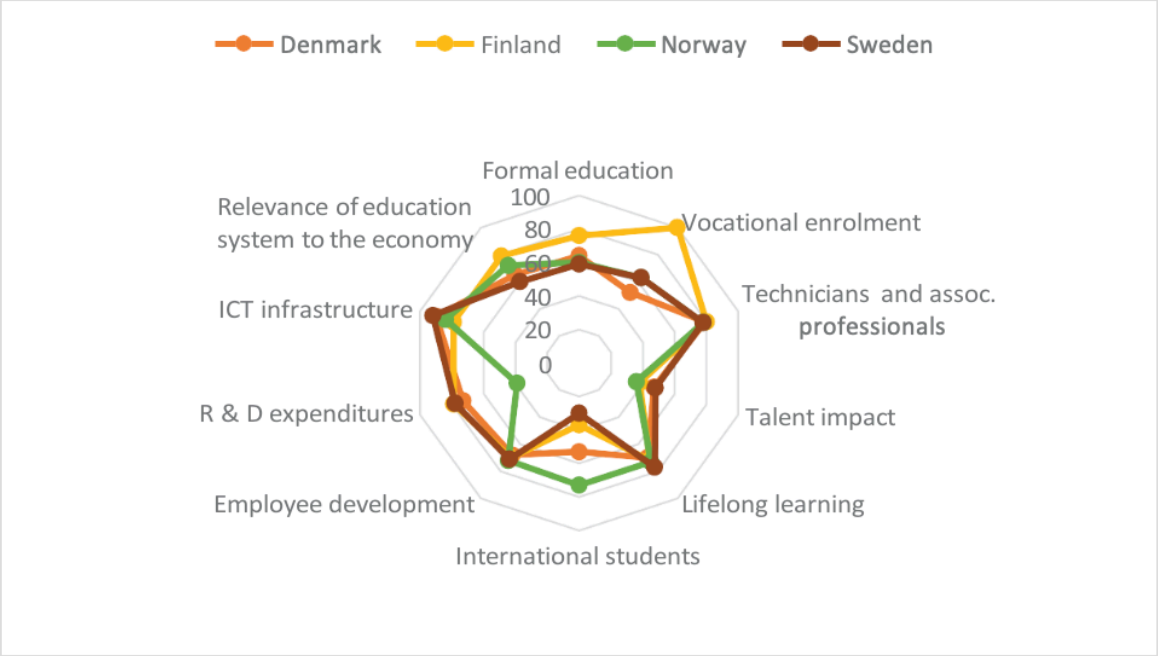

Figure 9. Comparative factors of HR and education development in the Scandinavian countries.
Source: INSEAD, 201. All sub-index rankings in expert evaluations used for cob-web diagram are between 0 and 100

For Estonia, Skills gap as a major constrain is mostly accented factor, and significance of Talent impact is highest between selected countries (Fig. 9a).

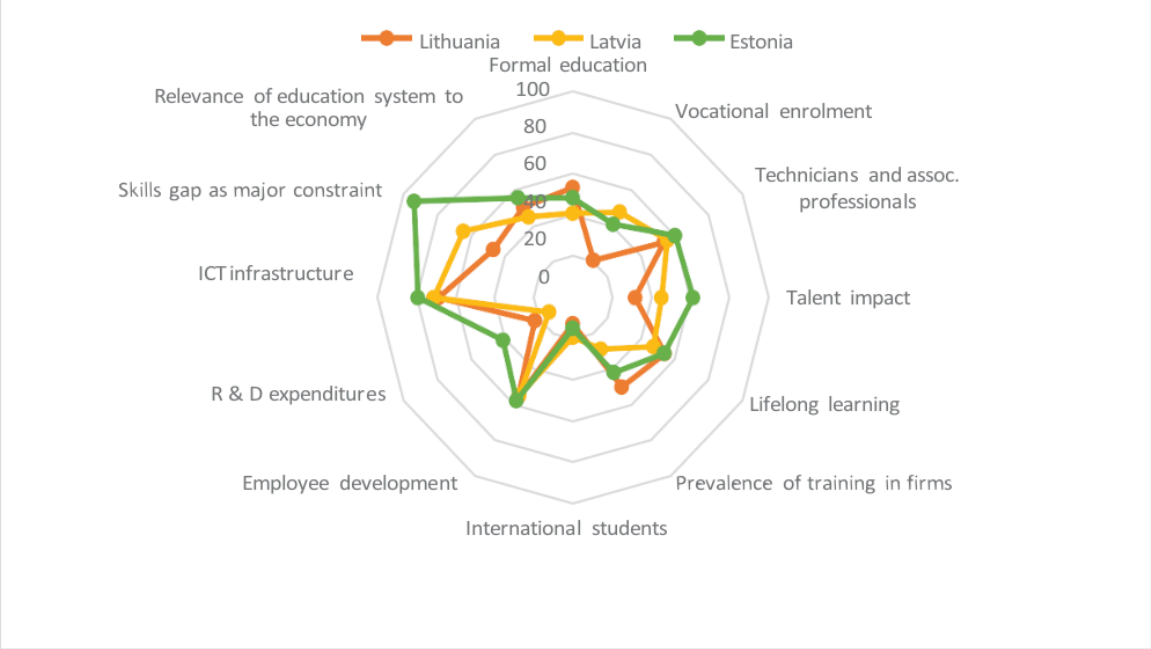

Figure 9a: Comparative factors of HR and education development in the Baltic countries
Source same as under Fig. 9.

The cause for concern is lag of Baltic States (comparing with neighbouring Scandinavia) in national talent development and preservation, as well as in the formation of professional skills needed, increase of the funds for applied research in the Baltic countries because it leads to backwardness by innovation performance (return). Fig. 10-12 revealed that many those problems are dependent on low level of R&D expenditures determining low brain gain, vocational enrolment and employable skills (especially in Lithuania). But both group of countries achieved high level in use of virtual social nets within EU; use of virtual professional nets is different: only Denmark (86 scores) can be marked as a leader. Baltic countries have very low level (20-26 scores), and Finland (37 scores) also rather low level of this indicator, so important for smart innovative and sustainable economies (Fig. 10).

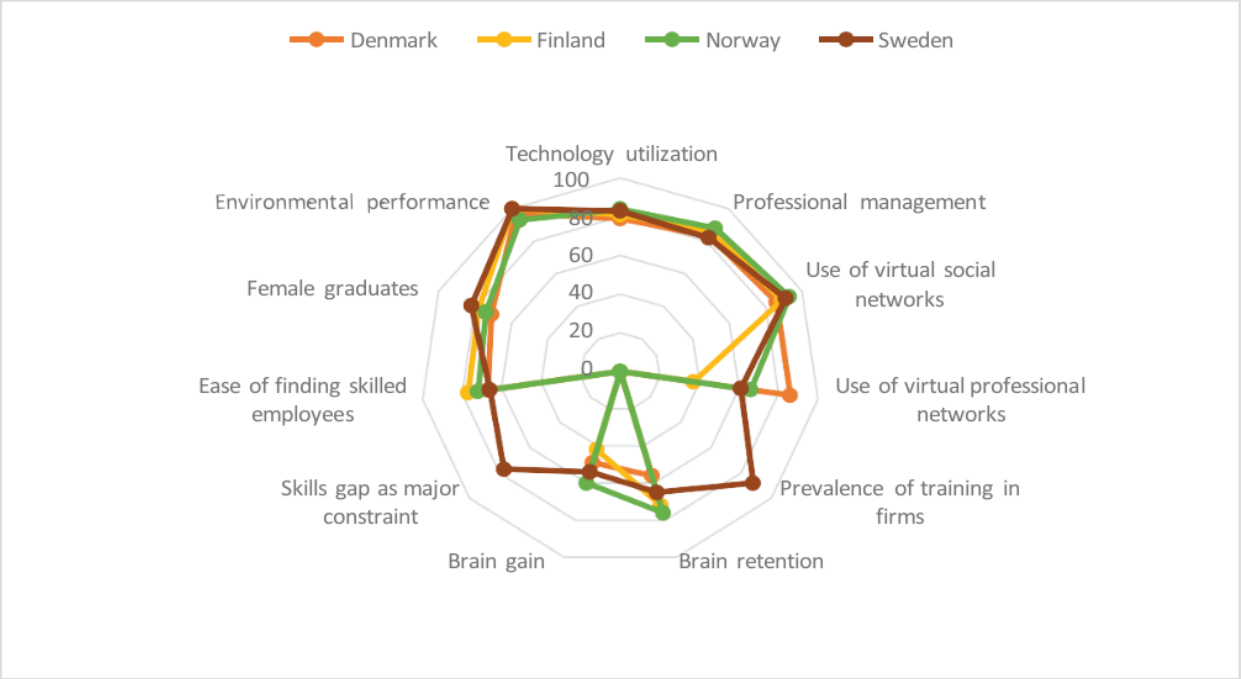

Figure 10. Indices of professional education surrounding in the Scandinavian countries
Source same as under Fig. 9.

By skills gap, the scores of the Baltics differs from 94 scores in Estonia to 47 in Lithuania; Sweden is evaluated by 77 scores and expert statistics for other Scandinavian countries is absent. Rather similar situation is with prevalence of training in firms: evaluation differs from 88 scores in Sweden to 51 in Lithuania and 29 in Latvia (expert statistics for other Scandinavian countries are absent, Fig. 10-10a).

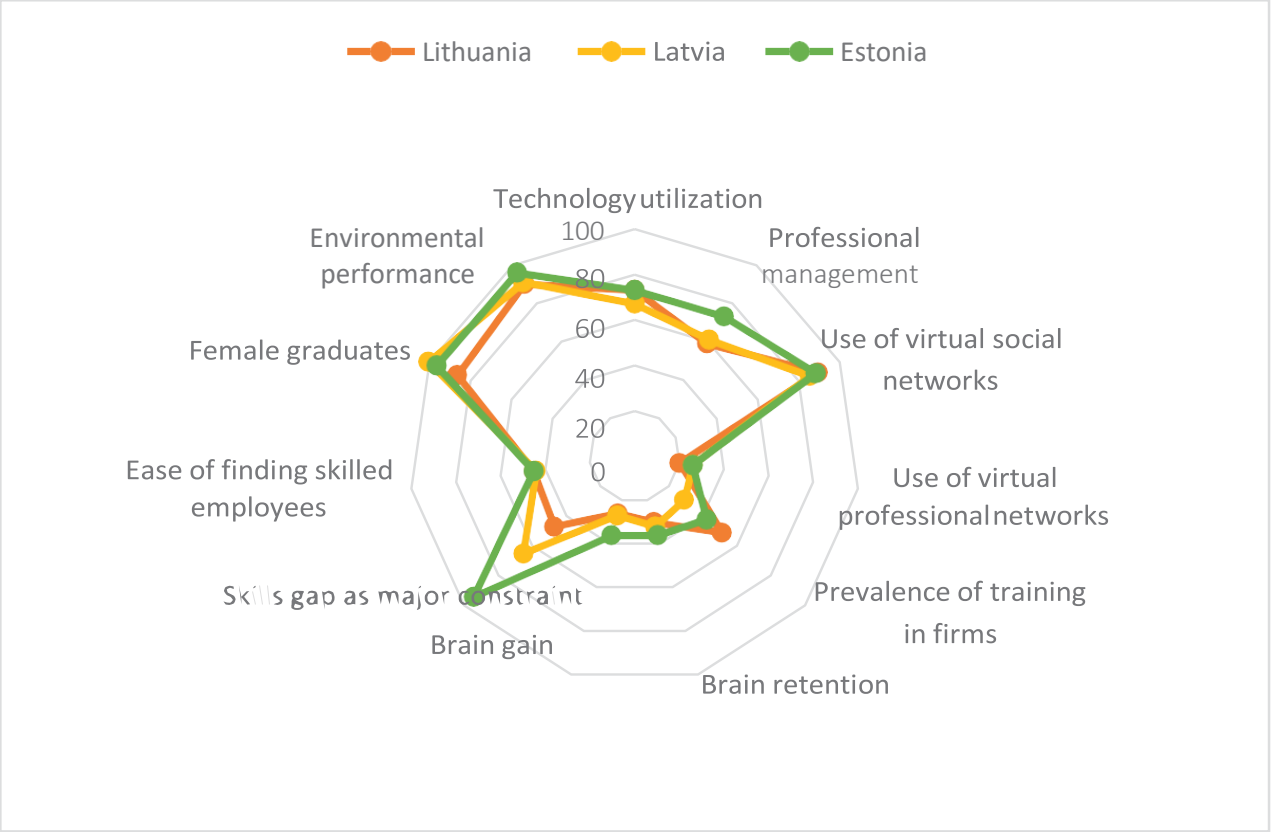

Figure 10a. Indices of professional education surrounding in the Baltic countries
Source the same as under Fig. 9.

Both more rapid development of professional education, management and retraining of specialists, along with the smart education and ICT infrastructure, should be given of greater attention in the expert evaluations of the global innovation and talent competitiveness indices (together with the use of social networks for developing competence: GTCI, 2017; European, 2016). Between the global talents´ competitiveness components characterising the professional education, the work efficiency and productivity indicators, the relationship of pay to productivity are also attributed to the factors hindering the ingenuity in Baltic countries. In addition, the export level of professional skills-intensive products and intensive services assessed by the experts was accounted.

The comparative data of *skills efficiency* in the Northern European States are presented in Fig.10-10a. They revealed short bottlenecks specific for the Baltic countries of this region in the labour productivity (Norway - 62 scores, other Scandinavians - between 43 and 47; Baltics – between 27 and 30), university rankings (Denmark and Sweden – respectively 71 and 72 scores, Latvia – 19, Lithuania 22 and Estonia 30 scores). Especially important are the level achieved and the differences in application of skills to high-value exports (Lithuania – 15 scores, Finland – 21, Norway and Sweden – respectively 28 and 29, Latvia and Estonia – respectively 32 and 34 scores). Substantial is the differentiation by innovation output: Sweden is evaluated with 81 scores, Finland – 70, Denmark – 66, Norway – 58 scores and Baltics vary from 39 (Lithuania) to 49 (Latvia) and Estonia – 65 scores.

All selected countries are on rather high levels by FDI and technology transfer: Scandinavians - between 65 scores (Denmark) and 57 (Finland); Baltics – from 72 scores (Lithuania) to 63-64 respectively in Latvia and Estonia. Unexpectedly wide variation is in new product entrepreneurial activity: from 12 scores for Norway to 60 in Denmark; Finland and Sweden are evaluated respectively 41 and 44 scores; Baltics vary between 54 scores (Estonia) and 38 (Latvia). Last years, all Northern European countries are about at the same rank by relationship of pay to productivity: Scandinavian countries between 55 and 58 scores and Baltics – between 59-60 (respectively Lithuania and Latvia) and 65 (Estonia) scores.

Figure 11. Main factors of efficiency dependence from education and competencies in the Scandinavian countries

Source same as under Fig. 9.

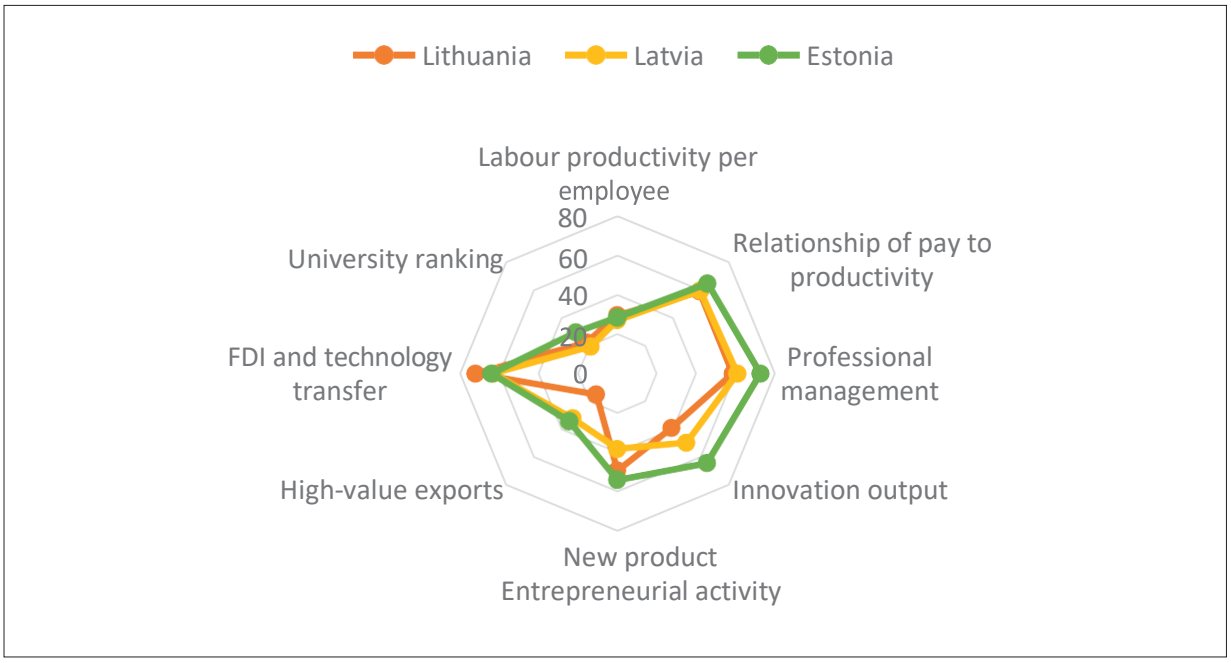

Figure 11a. Main factors of efficiency dependence from education and competencies in the Baltic countries

Source the same as under Fig. 9.

Student involvement in scientific research and related innovative business activities through specially prepared study programmes, professional practices and other forms of co-operation with business smart specialisation events, as well as the international exchange of knowledge DB and ICT packages, organisation (jointly with foreign academic institutions) of graduate courses for teachers and students, and recognition of common diplomas for specialists: all this makes a positive impact on the development of professional competence.

Better opportunities to continue professional studies and to use of the smart infrastructure a/o latest digital technology for research and professional skills development (especially for poorer students), as well as grants and other incentives for young postgraduates is creating the necessary conditions for the more wide development of perspective research and innovative business ideas. The continuing social differentiation influences substantially the innovative activity of postgraduates. It resulted of the wealthy private gains invested into new digital technologies, first-of-all into innovative non-material production and service computerization (INSEAD, 2018). In its turn, many Eastern European countries still are applying socially unfair labour income tax, compared to the assets and profits taxation, too weak social control of financial speculations.

Insufficient state support, first- of-all, in the Baltic States, was presented for education of competent students requiring a prolonged professional study (such as resident doctors, architects), also multiple practices or workshops abroad, supercomputer simulation facilities etc.

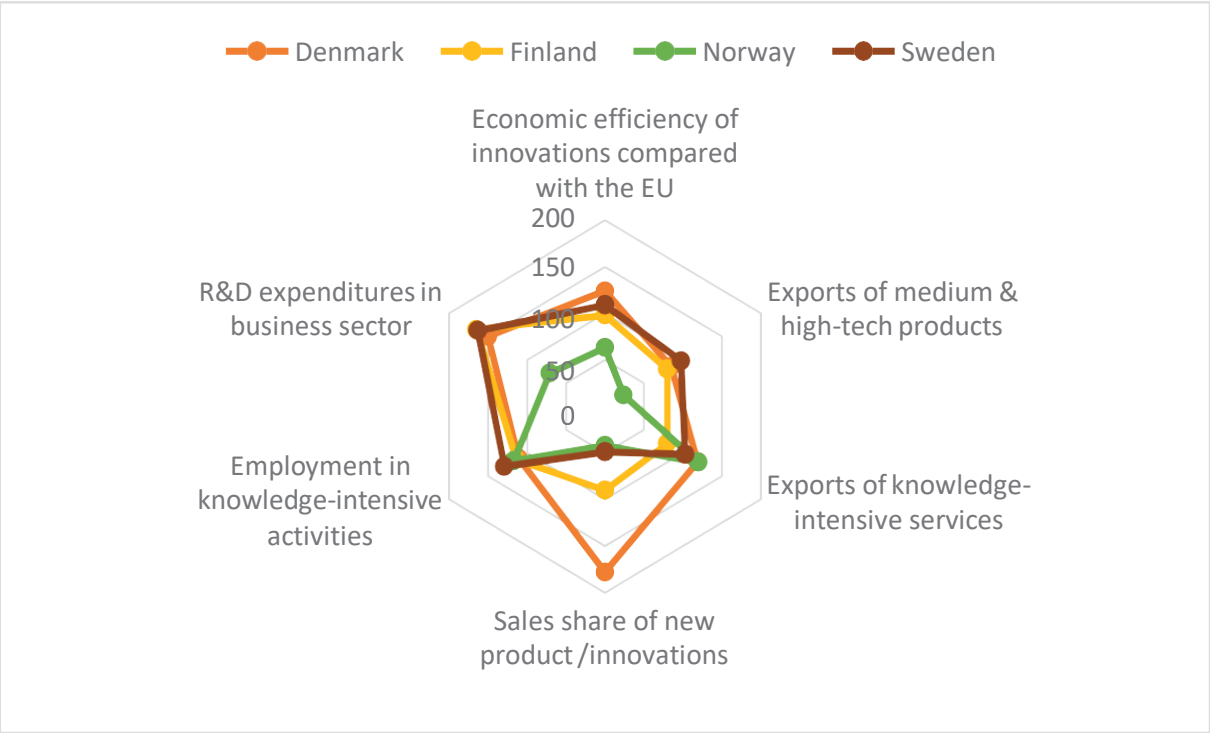

Figure 12. Main factors of professional performance in the Scandinavian countries relative to the EU

Source: European Innovation Scoreboard, 2017

By the interaction of some professional performance factors, Scandinavian states are beyond striking distance from Baltics: comparing with the EU average, the economic efficiency of innovations of Denmark was evaluated at 124 %, Sweden – 109 %, Finland – 98 % and only Norway – at 63%. At the same time, Lithuania was only at 29 %, Latvia – 44 % EU level and Estonia – 56 % (Fig. 16-17). Even more wide distribution of selected countries was by sales share of new products – from Denmark (178 %) to Sweden, Norway, Lithuania, Latvia (respectively 49-42-44-40 %) and by research expenditures in business (Finland and Sweden – respectively 165 and 163 %, Denmark – 150 %, Norway 71 %; but only 57 % in Estonia and too low 22 % in Lithuania and 11 % in Latvia).

Significant variation of selected country levels comparing with the EU average is also detected by exports of medium and high-tech products (from 24 % in Norway to 98 % in Sweden; more moderate are differences between the Baltics: from 57 % in Latvia to 76 % in Estonia). By export of knowledge-intensive services, the country levels range less: 119-120 % respectively for Denmark and Norway, 80 % - Finland, 70-79 % respectively Estonia and Latvia, but only 29 % for Lithuania.

The expert evaluations presented in the international reports shown that Baltic States have unused reserves for developing new entrepreneurial activity in knowledge-intensive services;

it is a rather serious problem for Lithuania, it depends on rather low evaluation of researchers 'productivity and talent impact on innovation. As a result, Lithuania is behind Estonia and Latvia by innovation output. Most of researchers (76.9%) in Lithuania worked in the public sector, but only 23.1% of them were associated with business enterprises (MOSTA, 2015a). The more detailed evaluation of institutional impact on the competency formation revealed the importance of the cooperation between science and business in the Baltic States in the recent years. The expected changes must include not only academic organisations like universities and colleges but also integrate the technology transfer centres, science and technological incubators, parks or valleys participating in the implementation of innovative ideas, more widely adapt ICT infrastructure for the smart education.

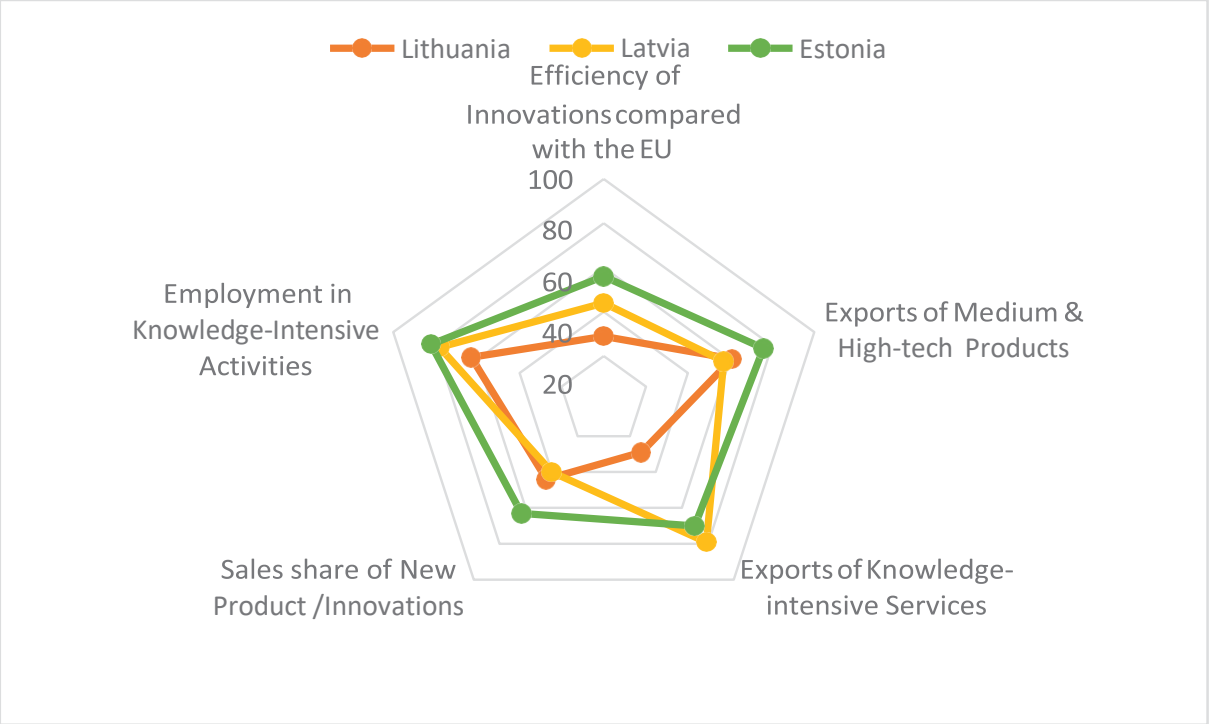

Figure 12a. Main factors of professional performance in the Baltic countries relative to the EU.

As one of the most important suggestions following from the research, is the conclusion that technological innovations which often are in the center of researches, can explain only about 25%, and social innovations – 75 % (Aslan & Çinar, 2018). In the process of consecutive sustainable development of competencies and skills, important attention must be devoted to online e-education, virtual reality, digital transfer of knowledge and skills, expertise and ingenuity of assessment technologies which should improve the quality of trained specialists and their adaptation to the newer processes of globalisation.

Among the changes favored by higher educational institutions, the development of creativity, of interdisciplinary studies is allowing to better acquire and use the innovative professional

skills. The popular suggestions are to teach all innovative offspring of the simplified business, finance, management, sociology and similar enterprising courses; they would help for engineers, technicians a/o leading specialties to become more quickly the wide profile managers and investors in professional fields effectively promoting perspective ideas. Most of special skills or professional decisions necessary for the qualified innovation risk assessment can be developed by disposing relevant e.DB, modern ICT and AI. Rather important is to increase the use of so-called demonstration packages and other computer tools, experimental classes to consolidate the vocational skills. The new e-learning opportunities liberate in some degree both the students and teachers from the collective classroom works; the remote virtual studies, "brain battles" and so on are expanded. The special system of incentives for higher education institutions is based on deep e-learning processes (Hardesty, 2017).

Sensitive and socially important aspect of universal sustainability is also different chances of representatives from various social groups to receive adequate opportunities for developing their professional talents and innovative competencies. But this wide aspect of research is scarcely illustrated by expert evaluations and require of special additional research. The social differentiation by income quintiles is in the EU about 1:5.2, and in Lithuania – 1:7.1, in Latvia - 1:6.3 (Eurostat, 2016), and the differentiation amplitude for the HR development is still widening in Lithuania (+1, 2008-16) with the economic and technological progress.

All these approaches are oriented both to innovative efficiency and sustainability of developing HR potential.

Conclusions

The UN sustainable development goals characterise the integrated situation of the universal sustainability by international comparative indicators which revealed most strong SDG sectors of the Scandinavian States and problemic SDG sectors of the Latvia and Estonia. But their scoreboards do not detail the most actual problems of the Baltic States: innovation infrastructures and talent competency education.

The innovation policy based on HR competency education and skills development has counted on their sustainability aspects both in specific and general approaches within the global dynamic process. The core competency and innovation parameters are closely interconnected and directly dependent on the level of ICT integration within both modern learning (education) and business activities influencing the sustainable development.

The global innovation determinants are taking into account the impact of core competency but do not detail the value and ways of their impact on the dynamic sustainable development and their specific features in the countries under review.

The achievements of Scandinavian countries as innovation leaders in developing sustainable potential revealed some necessary practical changes in HR development policy of the Baltic countries. However, the widespread international innovation ratings are formally comparing the levels and parameters of the competencies and the innovative impact of vocational training and scientific researches.

It is important to update systematically the smart techniques of self-learning also personal training plans and aspirations, providing increasing access to the rapidly developing e. technologies for individual innovative skills developing, initiative, rational competitiveness and entrepreneurship, also sense of community and teamwork by realising new ideas.

The institutional impact on the competency formation must include not only academic organisations like universities and colleges, but also integrate the technology transfer centers, science and technological incubators, parks or valleys participating in the implementation of innovative ideas and must widely adapt modern ICT infrastructure for the smart education. The global evaluations of education and competencies within universal sustainable development must be joint with regional and sectoral measurements of their detailed parameters.

References

Aslan I., Çinar, O. (2018). Measuring the Effectiveness and Innovative Capability of Bingöl University and Atatürk University In: *German-Turkish Perspectives on IT and Innovation Management*, Ed. F. Bakırci a/o, Springer

Building Effective Skills Strategies at National and Local Levels (2015). Better policies for better lives. June, OECD. Retrieved from: http://skills.oecd.org/documents /Building-effective skills-strategies- project-brochure.pdf. Access Date: 2 August 2017.

Boyd, D., Goldenberg, J. (2017). *Innovation Competency Model*. Retrieved from: http://www.innovationinpractice.com/innovation_in_practice/2011/04/innovation-competency-model.html

Chen, H.L., Grocott L.H., and Kehoe A. (2016). *Changing Records of Learning through Innovations in Pedagogy and Technology*. Retrieved from: http://er.educause.edu/articles/2016/3/changing-records- of-learning-through-innovations-in-pedagogy-and-technology. Access Date: 5 Oct. 2016.

Epstein, R. (2010). *Creativity and Sustainable Innovation: The Essential Keys for Progress.* Retrieved from: https://www.slideshare.net/sustainablebrands/creativity-and-sustainable-innovation-the-essential-keys-for-progress-dr-robert-epstein-5720337. Access Date: 03 July 2019.

European Commission (2014). *Measuring digital skills across the EU: EU wide indicators of digital competence*. Retrieved from: https:// ec.europa.eu/digital-single-market/en/news/measuring-digital- skillsacross-eu-eu-wide-indicators-digital-competence.

European Innovation Scoreboard 2019. Retrieved from: https://ec.europa.eu/ docsroom/ documents/ 36163. Access Date: 18 June 2019.

Franceschi R.B., Ramos A.J., Morrissey L., Triviño M.J. (2016). Neutral Spaces: The Close Relationship Between Professional and Educational Spaces. China-USA Business Review, March, Vol. 15, No. 3, 148-155.

Hardesty, L. (2017). *Explained: Neural networks.- MIT News*. Retrieved from: http://news.mit.edu/2017/ explained-neural-networks-deep-learning-0414

IBRD (2017). *Ease of Doing Business in Lithuania*. World Bank Group Retrieved from: http://www. doingbusiness.org

Income Inequality in the EU (2018). Eurostat. Retrieved from: https://ec.europa.eu/eurostat/ web/products-eurostat-news/-/EDN-20180426-1

INSEAD a/o (2018). *The Global Innovation Index: Energizing the World with Innovation*. Dutta, S., Lanvin, B., and Wunsch-Vincent, S., Eds. INSEAD - Johnson Cornell Univ.–WIPO. Retrieved from: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2018.pdf. Access Date: 03 July 2019.

INSEAD (2017). *The Global Talent Competitiveness Index: Talent and Technology: Shaping the Future of Work*. Lanvin, B., and Evans, P., Eds. Retrieved from: http://www.gtci2017.com/ documents/ GTCI_2017_ web_r5.pdf. Access Date: 4June 2017.

Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G. (2019). *Sustainable Development Report 2019*. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network. Retrieved from: https://s3.amazonaws.com/ sustainabledevelopment.report/2019/2019_sustainable_development_ report.pdf. Access Date:18 July 2019

Transparency International (2019). *Corruption Perceptions Index 2017*. Transparency International, Berlin, Germany. Available from: https://www.transparency.org/news/ feature/corruption_perceptions_index _2017

Turban E. et al. (2015), E-Learning, E-Training, and E-Books. *Electronic Commerce. A Managerial and Social Networks Perspective*. 8th rev. ed., Springer Intl Publ. Retrieved from: http://www.springer. com/gp/book/ 9783319100906. Access Date: 27 May 2016.

UNDP (2016). *Core Competency Framework* Retrieved from: 2016.http://www.undp.org/ content /dam/ undp/library/corporate/Careers/undp-hr-core-competency-2016.pdf.

World Economic Forum (2018). *Global Competitiveness Report 2018*. Ed. Schwab K. Retrieved from: http://www3.weforum.org/docs/GCR2018/05FullReport/ TheGlobalCompetitiveness Report 2018.pdf

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