Efficient Assessment for Using Qualified Personnel in the Economy

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Abstract:

The work analyzed the country's gross domestic product (GDP) dependence on the level of education of the employed population in the economy and the development of the institutional environment.

The study was conducted by a comparative analysis of selected countries of the OECD, the Russian Federation and Brazil on the ratio of Gross Domestic Product per person of the employable population to the proportion of population in the cohort under consideration with higher and secondary vocational education. These indicators of the efficiency of the use of skilled personnel in the economy correlate to the level of institutional environment development.

The study shows that an increase in the proportion of the educated population in working age alone does not lead to an adequate or expected increase in GDP. The effect is highly dependent on the level of institutional environment development that imposes on this process the natural limitations expressed in the limited needs of the society in qualified personnel. With the example of countries divided into groups according to efficiency indicator, it is shown that in each group the efficiency of the use of skilled personnel varies.

The article gives the examples of countries where there is an imbalance in the number of skilled professionals. This imbalance occurs between the needs of the economy, the actual number and professionals being prepared.

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The most summarized outcome of the study is the conclusion that GDP growth by raising the educational level of the employed population, is not being addressed by increasing the number of skilled personnel in the economy. The increase in their number is a natural response to the needs of society. These needs, in turn, are largely shaped by the impact of the institutional environment.

1. Introduction

The assessment of the proportion of skilled personnel among employed people in the economy allows us to characterize the country's level of economic development in the most general way, but that did not always explain the reason for the differences in levels of development. Comparison of GDP with the quality of the invested "labour force", given the proportion of skilled personnel in the total working population, as well as the impact of the development of the society according to the indicators of institutional and infrastructural development levels, which is often not taken into account in such studies, has made it possible to assess the effectiveness of their use more fully and to obtain additional information in order to carry out a more objective analysis of the causes of economic backwardness/leadership of country's economy as compared to economies of other countries.

2. Methodological Framework

The level of qualification of the economically employed population in this study was determined by the proportion of specialists with higher and secondary vocational education (hereinafter - HE and SVE, respectively) in the total population between the ages of 25 and 64 years. The levels of education in question correspond to the levels of education defined by the International Standard Classification of Education (2013) (hereinafter ISCED) adopted by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2011, for the classification and presentation of internationally comparable statistics. The HE includes levels:

- ISCED 5: a short cycle of tertiary education;
- ISCED 6: Baccalaureate or its equivalent;
- ISCED 7: Master's degree or its equivalent;
- ISCED 3: Second stage of secondary education;
- ISCED 4: Post-secondary non-tertiary education.

The cohort, which ranged from 25 to 64 years, was defined as the cohort of the employable population and was then considered to be the number of people employed in the economy. This cohort is based on the availability of data in the UNESCO base for exactly that age cohort (UNESCO Institute for Statistics, 2017). In the category of "employed in the economy" data in the UNESCO database are not provided.

Statistical data (UNESCO Institute for Statistics, 2017) for countries of the Organization for Economic Cooperation and Development (OECD, 2017) (selected on the basis of representation of countries at different levels of development, provided that they have sufficient statistical data), the Russian Federation and Brazil. Data on skilled personnel in the population between the ages of 25 and 64 years are presented in tables 1 and 2, data for the number of students (of the HE and the SVE programs) are presented in tables 3 and 4.

Table 1. *The Proportion of Skilled Personnel with Secondary Vocational Education (ISCED Level 3,4) in the Population Aged 25-64 Years*

#	Countries	Years		
		2013	2014	2015
1	Czech	54,6%	54,6%	54,9%
2	Slovakia	48,5%	48,4%	49,2%
3	Germany	46,5%	47,0%	46,8%
4	Poland	40,7%	41,0%	41,5%
5	Hungary	39,0%	40,7%	41,3%
6	Latvia	41,7%	40,7%	41,2%
7	Austria	40,5%	40,4%	40,8%
8	Slovenia	40,1%	39,9%	40,0%
9	Sweden	37,3%	35,6%	35,4%
10	The Russian Federation	33,7%	34,3%	34,9%
11	Denmark	33,4%	34,0%	34,1%
12	New Zealand	22,5%	30,8%	33,0%
13	France	30,9%	32,1%	32,2%
14	Republic of Korea (south)	29,7%	29,9%	30,0%
15	Great Britain	27,9%	28,4%	27,6%
16	Greece	21,8%	22,4%	23,8%
17	Brazil	16,9%	22,8%	22,4%
18	Portugal	13,8%	15,1%	16,0%
19	Spain	13,3%	13,6%	14,4%
20	Mexico	12,1%	12,3%	12,5%
21	Turkey	10,4%	10,4%	10,5%
	Min.	10,4%	10,4%	10,5%

	Max.	54,6%	54,6%	54,9%
	Average	31,2%	32,1%	32,5%

Table 2. *The Proportion of Skilled Personnel with Higher Education (ISCED Level 5, 6, 7) in the Population Aged 25-64 Years*

#	Countries	Years		
		2013	2014	2015
1	Republic of Korea (south)			
2	United Kingdom	31,8%	33,0%	33,9%
3	Sweden	31,2%	32,5%	33,8%
4	Denmark	30,9%	32,1%	33,3%
5	New Zealand	27,1%	27,8%	29,2%
6	The Russian Federation	20,9%	28,5%	27,6%
7	France	24,1%	24,6%	25,6%
8	Latvia	23,1%	24,6%	24,6%
9	Austria	21,3%	21,8%	23,2%
10	Spain	22,0%	22,4%	23,1%
11	Germany	20,5%	21,5%	22,6%
12	Slovenia	21,0%	21,2%	21,9%
13	Poland	19,0%	20,0%	21,3%
14	Czech	16,4%	17,4%	18,3%
15	Hungary	15,3%	16,4%	17,2%
16	Greece	14,6%	15,9%	17,0%
17	Portugal	15,0%	15,7%	16,8%
18	Slovakia	13,7%	15,3%	16,4%
19	Mexico	13,4%	14,0%	14,8%
20	Turkey	10,3%	10,3%	10,6%
21	Brazil	8,8%	9,2%	10,0%
	Min.	7,3%	9,9%	9,8%
	Max.	7,3%	9,2%	9,8%
	Average	31,8%	33,0%	33,9%

Table 3. *The Proportion of Students Enrolled in Secondary Vocational Education (ISCED Level 3, 4) in Relation to the Population Aged 25-64 Years*

# by propor. of spec. with SVE in ec.	Countries	Number of students, thousands ppl.			Percentage of students in the population aged 25-64		
		2013	2014	2015	2013	2014	2015
20	Turkey	4 995,6	5 420,2	5 691,1	13,2%	14,0%	14,4%
12	New Zealand	297,9	296,5	292,9	13,0%	12,9%	12,7%
15	United Kingdom	4 117,2	4 195,1	4 195,1	12,3%	12,5%	12,4%

9	Sweden	540,2	525,7	532,9	11,0%	10,7%	10,8%
11	Denmark	311,2	311,4	311,6	10,7%	10,7%	10,8%
17	Brazil	10 742,4	10 985,5	10 710,5	10,1%	10,2%	9,8%
5	Hungary	574,7	546,5	516,5	10,3%	9,8%	9,3%
13	France	2 616,3	2 631,5	2 631,5	8,0%	8,0%	8,0%
7	Austria	389,7	383,3	377,5	8,3%	8,1%	8,0%
4	Poland	1 912,9	1 764,9	1 764,9	8,5%	7,9%	7,9%
1	Czech	494,7	475,7	465,5	8,2%	7,9%	7,8%
20	Mexico	4 443,8	4 682,3	4 682,3	7,7%	7,9%	7,7%
8	Slovenia	93,0	90,7	90,7	7,8%	7,6%	7,6%
3	Germany	3 404,3	3 349,1	3 334,1	7,7%	7,5%	7,5%
18	Portugal	408,8	396,8	405,8	7,1%	7,0%	7,2%
2	Slovakia	240,7	224,3	215,7	7,5%	7,0%	6,7%
19	Spain	1 632,9	1 662,6	1 716,3	6,1%	6,3%	6,5%
6	Latvia	75,1	70,7	66,9	6,8%	6,5%	6,1%
14	Republic of Korea (south)	1 903,9	1 849,9	1 798,8	6,4%	6,2%	6,0%
16	Greece	371,0	353,1	353,1	6,1%	5,9%	6,0%
10	The Russian Federation	3 046,6	2 885,6	2 887,5	3,6%	3,4%	3,4%
	Min.				3,6%	3,4%	3,4%
	Max.				13,2%	14,0%	14,4%
	Average				8,6%	8,5%	8,4%

Table 4. *The Proportion of Students Enrolled in Higher Education Programs (ISCED Level 5, 5, 7) in Relation to the Population Aged 25-64 Years*

# by propor. of spec. with HE in ec.	Countries	Number of students, Thousand ppl.			Percentage of students in the population aged 25-64		
		2013	2014	2015	2013	2014	2015
20	Turkey	4 895,2	5 405,4	5 984,7	12,9%	14,0%	15,2%
5	New Zealand	248,2	252,2	261,3	10,8%	10,9%	11,3%
16	Greece	636,3	653,5	653,5	10,5%	11,0%	11,1%
1	Republic of Korea (south)	3 276,3	3 248,3	3 195,5	11,1%	10,9%	10,7%
4	Denmark	281,5	291,5	303,8	9,7%	10,1%	10,5%
9	Austria	397,1	396,6	401,9	8,5%	8,4%	8,5%
3	Sweden	415,1	407,9	407,2	8,5%	8,3%	8,2%
13	Poland	1 860,4	1 719,3	1 719,3	8,3%	7,7%	7,7%
8	Latvia	92,0	87,3	83,7	8,4%	8,0%	7,7%
6	The Russian Federation	7 376,9	6 859,2	6 469,3	8,8%	8,1%	7,6%
21	Brazil	7 452,5	7 977,3	8 183,1	7,0%	7,4%	7,5%
10	Spain	1 945,8	1 957,8	1 931,9	7,3%	7,4%	7,4%
12	Slovenia	94,1	87,6	87,6	7,9%	7,3%	7,4%

7	France	2 268,6	2 319,9	2 319,9	6,9%	7,1%	7,1%
2	United Kingdom	2 277,1	2 241,5	2 241,5	6,8%	6,7%	6,6%
11	Germany	2 566,8	2 697,5	2 781,6	5,8%	6,0%	6,2%
14	Czech	402,2	393,5	370,9	6,7%	6,5%	6,2%
18	Slovakia	198,6	187,8	187,8	6,2%	5,9%	5,9%
17	Portugal	351,5	342,0	318,2	6,1%	6,0%	5,6%
19	Mexico	3 273,2	3 390,0	3 390,0	5,7%	5,7%	5,6%
15	Hungary	351,7	322,1	300,5	6,3%	5,8%	5,4%
	Min.				5,7%	5,7%	5,4%
	Max.				12,9%	14,0%	15,2%
	Average				8,1%	8,1%	8,1%

Tables 5 and 6 and figures 1 and 2 provide data for the replacement of specialists with the HE and SVE in the employed population in the economy by a simplified calculation on the data in tables 1-4. Departure by age was taken as proportional departure of 1/40 of all specialists from the age cohort from 25 to 64 years, inflow - as a number of 1/3 from the secondary vocational education programs students and 1/3.5 part of the Higher education programs.

Table 5. *Dynamic of Replacement of Specialists with Senior Vocational Education in Economy*

Countries	Increase by output	Departure by age	Arrival/ departure	The current value of the share of the specialists with SVE
Turkey	1897,0	103,7	18,29	0,11
Mexico	1560,8	188,5	8,28	0,12
Spain	572,1	94,5	6,05	0,14
United Kingdom	1398,4	232,8	6,01	0,28
Portugal	135,3	22,6	5,99	0,16
Brazil	3570,2	614,5	5,81	0,22
New Zealand	97,6	19,0	5,13	0,33
Denmark	103,9	24,6	4,21	0,34
Sweden	177,6	43,6	4,07	0,35
Greece	117,7	35,1	3,36	0,24
France	877,2	263,1	3,33	0,32
Hungary	172,2	57,4	3,00	0,41
Republic of Korea (south)	599,6	224,1	2,68	0,30
Austria	125,8	48,2	2,61	0,41
Slovenia	30,2	11,9	2,54	0,40

Poland	588,3	232,0	2,54	0,41
Germany	1111,4	523,2	2,12	0,47
Latvia	22,3	11,2	1,99	0,41
Czech	155,2	82,2	1,89	0,55
Slovakia	71,9	39,5	1,82	0,49
The Russian Federation	962,5	741,4	1,30	0,35

Table 6. *Developments in the Replacement of Specialists with Higher Education in the Economy*

Countries	Growth through output	Departure by age	Arrival/ departure	The current value of the proportion of the specialists with SVE
Turkey	1709,9	1003,6	1,70	0,10
New Zealand	74,6	58,1	1,29	0,28
Greece	186,7	146,7	1,27	0,17
Republic of Korea (south)	913,0	750,9	1,22	0,34
Denmark	86,8	72,5	1,20	0,29
Austria	114,8	118,8	0,97	0,23
Sweden	116,3	124,2	0,94	0,33
Poland	491,2	557,7	0,88	0,18
Latvia	23,9	27,2	0,88	0,23
The Russian Federation	1848,4	2118,6	0,87	0,26
Slovenia	25,0	29,6	0,84	0,21
Spain	552,0	654,4	0,84	0,23
Brazil	2338,0	2771,9	0,84	0,10
France	662,8	815,8	0,81	0,25
United Kingdom	640,4	847,7	0,76	0,34
Germany	794,7	1118,1	0,71	0,22
Czech	106,0	149,1	0,71	0,17
Slovakia	53,7	80,2	0,67	0,15
Portugal	90,9	140,4	0,65	0,16
Mexico	968,6	1542,8	0,63	0,11

Figure 1. *The correlation between the growth of specialists with a secondary vocational education (considering the age of departure) and the current value of the proportion of professionals in the total population aged 25-64 years*
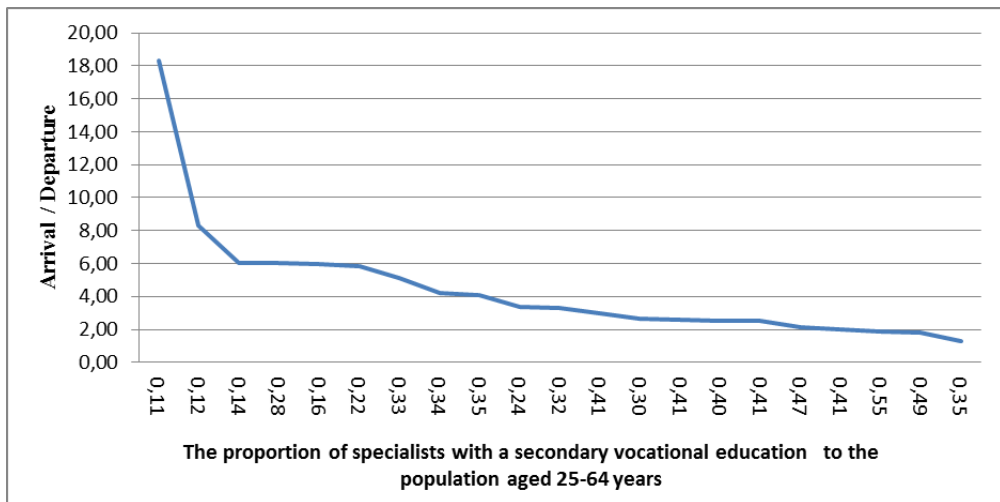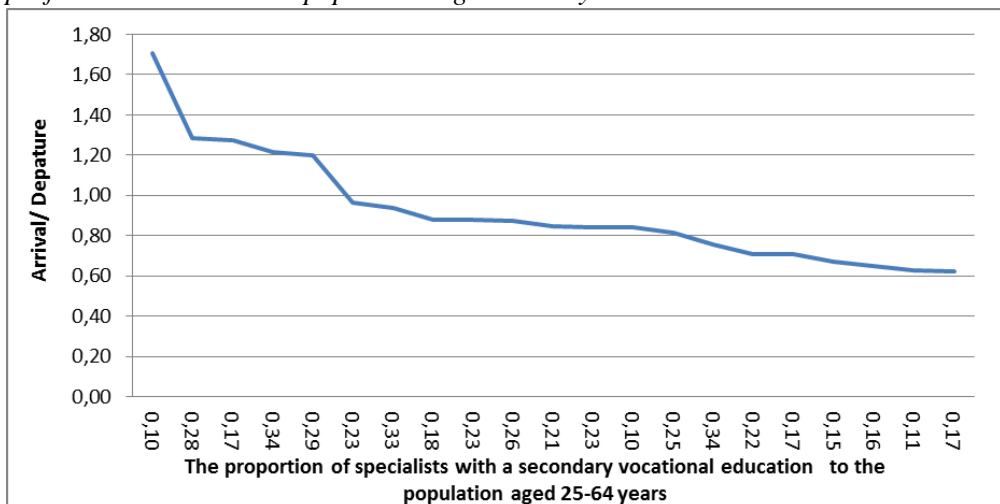
Figure 2. *The correlation between the growth of specialists with a higher education (taking into account the age of departure) and the current value of the proportion of professionals in the total population aged 25-64 years*

Ratio 1/3 and 1/3.5-the ratio of graduates to the total number of students is based on the duration of the educational programs at different levels based on UNESCO data (ISCED, 2013). Thus, in determining the proportion of HE graduate, it was considered that the minimum duration of ISCED 5 level was 2 years and usually it lasts less than three years. For ISCED 6, 7 the duration of the first-degree programs typically ranges from three to four years in the form of full-time education at tertiary education level, the second and subsequent degree programs at that level tend to last for 1-4 years and take place in the form full-time education. Accordingly, the

average time of study was set at 3.5 years, respectively, in the proportion of graduates-1/3.5.

Table 7 presents GDP data and its distribution by branch of the economy, table 8 shows the distribution of workers by industries. Table 9 shows the data for the 4 countries with the highest GDP for the number of employed in the economy, table 10 shows the data for the 4 countries with the lowest GDP for the number of workers in the economy.

Table 7. *GDP Distribution by Economic Sectors, %*

#	Countries	Economic sectors,%								GDP/ per thousands $
		All	Agri cul.	Ind.	Constr	Trade	Fin.	Pub. admin	Other	
1	Denmark	100	1,3	18,1	4,4	23,8	25,4	23,4	3,6	92,67
2	Sweden	100	1,4	19,7	6	22,9	22,6	24,5	3	91,82
3	Austria	100	1,5	21,8	6,9	25,2	24,1	17,6	2,9	89,34
4	Germany	100	0,8	25,9	4,8	20,2	26	18,3	4,1	86,02
5	France	100	1,7	13,8	5,7	22,5	30,1	23,2	3	81,10
6	United Kingdom	100	0,6	13,5	6,4	24,6	32,6	18,3	4,1	78,64
7	New Zealand	100	6,9	17,6	5,8	20,3	29,4	16,3	3,7	72,89
8	Spain	100	2,5	17,5	5,6	28	23,4	18,6	4,3	58,56
9	Republic of Korea (south)	100	2,7	33,8	5,9	18,8	19,3	16,9	2,6	57,74
10	Czech	100	2,7	32,4	5,6	22,9	19,5	14,8	2,2	56,31
11	Slovenia	100	2,2	27,1	5,7	24,5	20,8	17	2,7	53,76
12	Portugal	100	2,3	17	4,2	28,5	24,6	20,5	2,9	52,04
13	Slovakia	100	3,7	24,7	8,3	27	18,4	14,5	3,3	49,23
14	Greece	100	3,8	11,6	1,8	30	27,5	20,8	4,5	47,62
15	Turkey	100	8	22	5,1	32	20,6	10,7	1,7	47,00
16	Hungary	100	4,4	26,4	4,3	23,7	21	17,3	2,8	44,94
17	The Russian Federation	100	4,7	26,7	5,9	24	21,6	14,8	2,3	44,24
18	Poland	100	3,3	25,9	7,5	30,2	16,6	14,2	2,3	43,61
19	Latvia	100	4,9	18,7	6,4	33,5	20,6	13,4	2,6	43,30
20	Mexico	100	3,3	27,1	7,4	27,5	21,6	11	2,1	37,18
21	Brazil	100	4,9	21,1	6,3	20,9	22,9	19,3	4,7	31,42
	Median	100	2,7	21,8	5,8	24,5	22,6	17,3	2,9	55,72

Abbreviations adopted in the table: GDP-Gross domestic product on purchasing power parity; Agricul.: agriculture, forestry, hunting and fishing; Ind. - Industry; Constr. - Construction; Tr. - Trade, hotel and restaurant business, transport and communications; Fin.-financial activities, real estate transactions, renting; Pub.

admin. - Public administration, education, health, social services; Other: other branches of the economy.

Table 8. *Distribution of Workers by Economic Sectors, %*

#	Countries	Economic sectors,%								GDP/ per thousands $
		All	Agricul.	Ind.	Constr	Trade	Fin.	Pub. admin	Other	
1	Denmark	100	2,6	13,8	5,8	26,7	12,3	33,4	5,4	92,67
2	Sweden	100	2	12,7	6,8	24,4	16,1	32,4	5,6	91,82
3	Austria	100	4,9	17,1	9,1	28,8	13,1	22,3	4,7	89,34
4	Germany	100	1,5	21,5	6,7	25,3	14,4	25,7	4,9	86,02
5	France	100	2,9	14,5	7,2	24,5	13,7	30,1	7,1	81,10
6	United Kingdom	100	1,2	11,6	7,3	27,4	16,4	29,7	6,4	78,64
7	New Zealand	100	6,9	13,4	8,2	27,9	14,7	23,6	5,3	72,89
8	Spain	100	4,4	14,1	6,6	31,7	12,9	22,3	8	58,56
9	Republic of Korea (south)	100	7,2	17,3	7,7	32	12,9	14,7	8,2	57,74
10	Czech	100	3,1	29,4	8,7	24,8	10,4	19,6	4	56,31
11	Slovenia	100	8,3	24,9	5,9	24,9	10,9	21,1	4	53,76
12	Portugal	100	10,5	17,9	7,7	26,2	9,2	22,4	6,1	52,04
13	Slovakia	100	3,2	27,2	10,3	26	8,6	21,6	3,1	49,23
14	Greece	100	13	11,2	5,5	32	10,8	22,8	4,7	47,62
15	Turkey	100	23,6	19,1	6,9	24,3	7,6	14,1	4,4	47,00
16	Hungary	100	5,2	23,5	6,3	27,8	10,1	23,1	4	44,94
17	The Russian Federation	100	7	20,2	7,6	27,8	9	24,4	4	44,24
18	Poland	100	12,6	22,4	8	24,6	9,5	20	2,9	43,61
19	Latvia	100	8,4	16,3	7,1	28,8	11,5	23,1	4,8	43,30
20	Mexico	100	13,1	17,4	8,3	33,8	5,9	13,1	8,4	37,18
21	Brazil	100	14,6	14	8,7	28,1	8,8	15,1	10,7	31,42
	Median	100	6,9	17,3	7,3	27,4	10,9	22,4	4,9	55,72

Abbreviations adopted in the table: GDP-Gross domestic product on purchasing power parity; Agricul.: Agriculture, forestry, hunting and fishing; Ind. - Industry; Constr. - Construction; Tr. - Trade, hotel and restaurant business, transport and communications; Fin. -financial activities, real estate transactions, renting; Pub. admin. - Public administration, education, health, social services; etc. - Other branches of the economy.

Table 9. *Data on GDP and the Number of Workers in Four Countries with the Highest GDP for the Number of Workers in the Economy*

#	Countries	All	Agricul.	Ind.	Constr.	Trade	Fin.	Pub. admin.	Other	GDP/ person	Proportion of specialists with HE in the economy	Proportion of specialists with SVE in economy
						Distribution of GDP, %						
1	Denmark	100	1,3	18,1	4,4	23,8	25,4	23,4	3,6	92,67	29,2%	34,1%
2	Sweden	100	1,4	19,7	6	22,9	22,6	24,5	3	91,82	33,3%	35,4%
3	Austria	100	1,5	21,8	6,9	25,2	24,1	17,6	2,9	89,34	23,1%	40,8%
4	Germany	100	0,8	25,9	4,8	20,2	26,0	18,3	4,1	86,02	21,9%	46,8%
	Median	100	1,35	20,8	5,4	23,4	24,8	20,9	3,3	90,60	26,1%	38,1%
						Distribution of workers, %						
1	Denmark	100	2,6	13,8	5,8	26,7	12,3	33,4	5,4			
2	Sweden	100	2,0	12,7	6,8	24,4	16,1	32,4	5,6			
3	Austria	100	4,9	17,1	9,1	28,8	13,1	22,3	4,7			
4	Germany	100	1,5	21,5	6,7	25,3	14,4	25,7	4,9			
	Median	100	2,3	15,45	6,75	26	13,75	29,1	5,15			
						GDP/quantity of workers, %						
	Ratio		0,6	1,3	0,8	0,9	1,8	0,7	0,6			

Abbreviations adopted in the table: GDP-Gross domestic product on purchasing power parity; Agricul.: agriculture, forestry, hunting and fishing; Ind. - Industry; Constr. - Construction; Tr. - Trade, hotel and restaurant business, transport and communications; Fin. - financial activities, real estate transactions, renting; Pub. admin. - Public administration, education, health, social services; Other: other branches of the economy.

Table 10. *Data on GDP and the Number of Workers in 4 Countries with Lower GDP for the Number of Workers in the Economy*

#	Countries	All	Agricul.	Ind.	Constr.	Trade	Fin.	Pub.admin.	Other	GDP/ person	Proportion of specialists with HE in the economy	Proportion of specialists with SVE in economy
						Distribution of GDP, %						
18	Poland	100	3,3	25,9	7,5	30,2	16,6	14,2	2,3	43,61	18,3%	41,5%
19	Latvia	100	4,9	18,7	6,4	33,5	20,6	13,4	2,6	43,30	23,2%	41,2%
20	Mexico	100	3,3	27,1	7,4	27,5	21,6	11	2,1	37,18	10,6%	12,5%
21	Brazil	100	4,9	21,1	6,3	20,9	22,9	19,3	4,7	31,42	9,8%	22,4%
	Median	100	4,1	23,5	6,9	28,9	21,1	13,8	2,5	40,24	14,4%	31,8%
		Workers										
18	Poland	100	12,6	22,4	8	24,6	9,5	20	2,9			
19	Latvia	100	8,4	16,3	7,1	28,8	11,5	23,1	4,8			
20	Mexico	100	13,1	17,4	8,3	33,8	5,9	13,1	8,4			
21	Brazil	100	14,6	14	8,7	28,1	8,8	15,1	10,7			
	Median	100	12,9	16,85	8,15	28,45	9,15	17,6	6,6			
		GDP/number of employees,%										
	Ratio		0,3	1,4	0,8	1,0	2,3	0,8	0,4			

Abbreviations adopted in the table: GDP-Gross domestic product on purchasing power parity; Agricul.: Agriculture, forestry, hunting and fishing; Ind. - Industry; Constr. - Construction; Tr. - Trade, hotel and restaurant business, transport and communications; Fin. -financial activities, real estate transactions, renting; Pub. admin. - Public administration, education, health, social services; Other: other branches of the economy.

3. Results and Discussion

Comparison of averages for the four countries with the highest and lowest ratios of GDP to the working population (further defined as developed and developing countries) first reveals the difference in the proportion of workers in trading sectors, finance and public administration, where this proportion is 69% for developed countries, 55% for the countries with the lowest income (tables 8-9). These industries generate on average 2/3 of GDP and are the most profitable. A large

proportion of the labour force for the first four countries indicates the development of these industries, which is due to the development of the society in the first place, and the structure of its demands that are met by a high level of skilled manpower demanded in the economy and the high level of technology used. The high positions of these countries in the rating of innovation development (The Global Innovation Index, 2017) prove that point, which in turn is largely predetermined by the developed institutional environment in their countries.

Plenty of works were devoted to the dependence of GDP on the development of the institutional environment; the most cited works include the works of J. Searle (1995), G.B. Kleiner (2016) and Witold J. Henisz (2000). The work of G.B. Kleiner (2016) defines the general notion of the Institute as a system "the core of which is a set of interrelated social rules". The institutional subsystem, in relation to those listed in the same work and those included in the common system, such as historical, cultural, industrial and technological and other systems, is the most integrated reflection of the achieved level of development of "social rules that form social interactions" by the subsystem, so the institutional development indicator, such ranking of countries is published annually (The Global Innovation Index (2017) assessment for the 2016), taken as an integral indicator that reflects the development of society.

In the industries listed above, specialists with higher education are most in demand. Thus, in the financial sphere, for example, this proportion reaches 70% of all workers, and in the sphere of public administration 50% (Russia in numbers (2016). The development of these areas also requires an appropriate number of professional personnel, which is observed in the difference between the two groups of countries in terms of the proportion of specialists with higher education - 26.1% and 14.4%, respectively. The development of the training system affects the development of the economy. There is sufficient material on the studies carried out to prove this point (Pribac & Anghelina, 2015; Ciucu & Dragoescu, 2014; OECD, 2016; Hanushek & Wößmann, 2007; Hawkes & Ugur, 2012).

The London School of Economics (Parr, 2016) carried out a study of nearly 15,000 universities in 78 countries. The work led them to the conclusions that doubling the number of institutions of higher education results in a 4.7% increase in per capita GDP in five years. But if the institutional environment is not developed, the effect may not occur, or it would be worse. A case in point is Turkey, where, because of the government crackdown following the attempted coup d'état in 2016, more than 1500 academic deans were forced to retire. In these circumstances, will the effect of increasing GDP occur from the growth of specialists with higher education (as we can see in table 4, Turkey is the first in the growth rate of higher education training) if there are institutional problems, as in mentioned example, in the form of state regulation of the composition of staff in the academic environment in which political loyalty plays a priority role. The effect is likely to be very offset by, as the quality of the graduates with higher education will be lost if their number will grow.

It is worth noting that since the primary concern is the demand of society, the high importance of the share of specialists with higher education alone is not a sufficient condition for the development of these industries. This is well illustrated by the data for Spain, the Russian Federation and Latvia, where the proportions of specialists with higher education is high and are 22.6%, 25.6% and 23.2% respectively (table 2), which is close enough to the average for the first four countries (26.1%, but their GDP is 65%, 50% and 48% of the average of the first four countries-90.6 (Table 4 and 7).

Bearing in mind that, for other industries, the indicators of the structure of the employed are close to the groups of countries in question (apart from the agriculture sector, where the proportion of the population employed is relatively smaller, as are the shares of GDP-1.5% for developed countries, 4% for developing countries, respectively, the proportion of personnel with higher education is low as well), it can be said that in the three countries the potential of specialists with higher education is realized inefficiently, as there is no adequate environment for that, and the level of technologies used is lower than the skill level of the workers. Unlike them, in the first four countries the level of qualification is high and implemented, in the countries of the second quad (except Latvia)-the level of qualifications is not high, as well as the value of GDP created in these countries (per employee), i.e., It can be said that it is effective in its human and industrial capacities, and in the three countries reviewed above it is not being used effectively.

1. The same is the case in the agricultural sector, but it is manifested in the opposite way: the number of persons employed in this industry in the first four countries is 2.3%, in the next 4 countries - 12.9%, while GDP, which is normalized by the number of workers in this area, is twice as high in the first four countries as in the second four. Since statistical databases do not have data on the level of education of workers by the sector, it can only be assumed that more efficient production in this area in the first four countries is also linked to the implemented advanced technologies and the use of highly qualified personnel.

2. Comparing the situation of countries by the percentage of specialists with higher and secondary vocational education shows that they can be divided into three groups. The first group is the countries with the highest level of GDP per person of working age, with the first place in ranking by the proportion of specialists with higher education and the average percentage of specialists with secondary vocational education. The second group is the countries with middle GDP per person of working age, occupying the top positions in the proportion of specialists with a secondary vocational education and the average by the proportion of specialists with higher education. The third group is low-GDP countries per person of working age, with lower positions by the proportion of both groups of specialists. Countries of the first group (table 9) are the first four countries,

supplemented by the Republic of South Korea and Great Britain, the 3d group includes the second four countries, supplemented by Turkey, and the other countries can be included in the 2nd group. Relating the quantitative proportions of specialists with GDP it can be said that the most effective educational potential is realized in countries of the 1 group, with a preponderant result achieved by the proportion of specialists with higher education. Effective enough but with a lesser result, it is implemented in countries of the second group and is of little relevance in the third group. In assessing the proportion of students, it can be said that countries of 2 and 3 groups are seeking to reduce the lag in the proportion of professionals with secondary vocational education, as evidenced by the number of students. For example, Turkey and Mexico are ranked in the top positions in the ratings of professional training (table 5, figure 1). There is clearly no such pattern in the training of specialists with higher education (table 6, figure 2), which is logically based on the primacy of the society's demand for these specialists. There are no such demands in the third and second group, since they should be preceded by institutional changes that do not take place quickly and that do not necessarily occur in all countries.

3. The proportion of the workforce in public administration also attracts attention (including education, health and social services). It can be seen that in the first four countries (table 8) their proportion in relation to the entire able-bodied population averages 29.1%, whereas only 17.6% for the second four countries. It can be assumed that, in addition to taking into account the direct number of education workers, the first four countries have more workers in public institutions, which, among others, are implementing programs to create the conditions for the realization of the educational capacity of the population.

In general, (see Tables 1 and 2), the absolute proportion of specialists of both levels is increasing and turning to the field of professional training (Tables 3-6, Figures 1 and 2), one can see the inverse relationship between the current situation with professionals with VSE in the economy and the process of their preparation: in countries where the current situation is worse (relative to other countries), it grows at an elevated pace and vice versa. For other reasons not discussed here, this pattern is not apparent for some countries, which can be attributed to objective factors (e.g. market needs) or is contradictory. The Russian Federation can serve as an example.

For example, holding a 10-th (average) position among the countries considered with a secondary vocational education (Table 3), the country has the last place in ranking by the training of specialists with the secondary vocational education is 21, the last place, about 2.5 times lower than an average value, and 4.2 times lower than maximum value. Table 11 shows the data to compare this indicator in the time range from 2003 to 2015 for comparison with Germany and Brazil as having a higher figure for the current proportion of such professionals (for Germany it is 46.8%, Russia 34.9%), and lower (in Brazil - 22.4%). As can be seen, the training system in

both countries is aimed at a substantially higher growth rate than the Russian Federation.

Table 11. *Data on the Number of Students Enrolled in Secondary Vocational Education Programs for Brazil, the Russian Federation and Germany*

Rate	Years												
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Brazil													
Quantity of st. of SVE, thousands of people	9 073	9 897	9 794	9 434	9 073	9 169	9 201	9 284	9 396	9 442	10 742	10 986	10 710
% by previous year		109.1	99.0	96.3	96.2	101.1	100.3	100.9	101.2	100.5	113.8	102.3	97.5
% by the year 2003		109.1	107.9	104.0	100.0	101.1	101.4	102.3	103.6	104.1	118.4	121.1	118.0
Population, millions people.	183,6	186,1	188,5	190,7	192,8	194,8	196,7	198,6	200,5	202,4	204,3	206,1	207,8
% by previous year		101.4	101.3	101.2	101.1	101.0	101.0	101.0	101.0	100.9	100.9	100.9	100.9
% by the year 2003		101.4	102.6	103.9	105.0	106.1	107.1	108.2	109.2	110.2	111.2	112.2	113.2
The Russian Federation													
Quantity of st. of SVE, thousands of people	5 141	5 122	4 909	4 603	4 195	3 716	3 345	3 224	3 104	3 165	3 047	2 886	2 888
% by previous year		99.6	95.8	93.8	91.1	88.6	90.0	96.4	96.3	102.0	96.3	94.7	100.1
% by the year 2003		99.6	95.5	89.5	81,6	72.3	65.1	62.7	60.4	61.6	59.3	56.1	56.2
Population, millions people.	145,0	144,3	143,8	143,2	142,8	142,8	142,7	142,9	142,9	143,0	143,3	143,7	146,3
% by previous year		99.5	99.7	99.6	99.7	100.0	99.9	100.1	100.0	100.1	100.2	100.3	101.8

% by the year 2003		99.5	99.2	98.8	98.5	98.5	98.4	98.6	98.6	98.6	98.8	99.1	100.9
Germany													
Quantity of st. of SVE, thousands of people	2 782	2 796	2 837	2 922	2 882	2 921	2 745	2 747	2 726	2 646	3 404	3 349	3 334
% by previous year		100.5	101.5	103.0	98.6	101.4	94.0	100.0	99.2	97.1	128.7	98.4	99.6
% by the year 2003		100.5	102.0	105.0	103.6	105.0	98.7	98.7	98.0	95.1	122.4	120.4	119.9
Population, millions people.	81,6	81,4	81,2	81,1	80,9	80,7	80,5	80,4	80,4	80,5	80,6	80,6	80,7
% by previous year		99.8	99.8	99.8	99.8	99.8	99.8	99.9	100.0	100.1	100.1	100.1	100.1
% by the year 2003		99,8	99,6	99,4	99,1	98,9	98,7	98,6	98,6	98,7	98,8	98,9	98,9

In the system of training for specialists with higher education the situation is different. Usually the proportion of students is higher in developed countries, which, as noted earlier, is determined by a more developed institutional environment, increased demands from society and developed technologies.

4. Conclusions

Educational potential of the working population is realized in the most effective way in countries with a well-developed institutional environment, where there is a demand from society for the development of relevant areas of activity, including high income and high technology fields. The latter include financial activities, trade, health care and education. It is in these countries that the intellectual potential of specialists with higher education is most fully utilized. In countries with less developed institutional environments, it is less effective because it is achieved mainly by the proportion of specialists with secondary vocational education. In these countries, specialists with higher education do not have sufficient conditions for full self-realization.

We can say that in countries with weak institutional and infrastructural environment there is a lack of development of field of application of skills for both specialists with secondary professional and tertiary education. Accordingly, in these countries the effectiveness of the use of professional skills is lower and, as a rule, the educational capacity itself is lower.

In summary, it can be concluded that the level of development of a country's economy is primarily determined by the institutional environment, the degree of perfection of which is determined by the level economy development, which has recently become a recognized provision (Richer, 2005). This environment is contradictory in the sense that ideally it should satisfy the social and business interests at the same time, but they often have the opposite goals.

The work of the G.B. Kleiner (2014) notes that "the challenge of socio-economic synthesis within an institutional approach carries with it the enormous potential to improve the efficiency of the economy and society and may well be compared to a solution to the task of thermonuclear fusion. This phrase, on the one hand, reflects the importance of solving this task of building an optimal model of the institutional environment, with a "huge" potential for increasing economic efficiency, on the other hand, how difficult the task is.

Therefore, the institutional environment, in addressing the need for skilled personnel, must also address the social needs of people to fulfil their potential through the creation of appropriate conditions and incentives in the training system as well as in the workplace. And the more optimal the solution of this task is, the higher economic results will be. The imperfection of the environment expressed in the imbalance of the needs of the economy for qualified professionals and the lack of appropriate conditions and an adequate training system for them. This has resulted in reducing efficiency of economy and reducing the level of trained workers.

Thus, exceeding the proportion of specialists with higher or secondary vocational education more than necessary does not increase GDP, as workers with higher education will be employed in jobs that do not require their level of training ("overqualified" specialists) and lose their skills over time, losing potential that could be realized more usefully. Therefore, with the aim of raising GDP by increasing the number of skilled personnel employed in the economic sphere, it is necessary to start with changes in the institutional environment.

5. Acknowledgements

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