Correlation of Educational Level, Labor Potential and Digital Economy Development in Slovakian, Ukrainian and Russian Experience

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Abstract **– The purpose of the current paper is to emphasize the role of intellectual labor potential in economy development and digitalization and to explore the features of intellectual work and education as main source and component of the digital information economy. The consequencies of scientific fields representatives' outflow and low renumeration for such three neighboring contries as Slovakia, Ukraine and Russia are observed; their economic indeces are discussed and compared as for more than 10 past years and the beginning of 2020 year. Slovakian, Ukrainian and Russian digitalization achievements and main benefits of this process were outlined in the global transformation process.**

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1. Introduction

Informational innovations are the indispensable condition for accelerating the growth of the states' economic potential. The current stage of Slovakian, Russian and Ukrainian socio-economic development is characterized as an active digital economy implementation.

Main benefits of digitalization for human capital are: developing customer expectancies; advanced and effective technological opportunities by lower cost; new generation of professionals and new jobs; growth of start-up companies; supportive legal structures; infrastructure changes in terms of new inter-city networks; real-time business; forecast models; collaboration between organizations; integrated workflows. Digital integration is necessary to ensure social justice.

It has been established that the main peculiarity of information systems' introduction is that "the technology takes out that instant information processing, which has been taking place for a long time inside our nervous system" [1].

The scientific researches, knowledge and technologies are the result of scientific work, the source of which is the educational system. But in the modern scientific literature, the questions of the

essence, content and measurement of human capital intellectual potential in digital economy in connection with the education are highlighted weakly.

Intellectual and social potential becomes significant in the formation of digital economy innovation. It is well known, that physical and natural capitals take only 16% and 20% respectively of world economic growth, whereas human capital – 64% and this number increases till 80% in developed countries [2].

2. Intellectual Potential in Digital Economy

2.1. Concept of Intellectual Labor Economy

In the period of the social labor division, the intellectual and physical work isolated one from the other formed independent activities. Wherein the common labor classification has not been formed yet in the current economy and the experts distinguish only the antonymic types of labor: tangible and intangible, physical and intellectual, productive and non-productive, concrete and abstract [3].

Economy of intellectual work represents the single industry discipline that includes the synthesis of economic theory and intellectual labor theory. The contingency and organic integrity of concepts and content, in its categorical essence, are underlying in a unified fundamental methodological approach of the theory of intellectual labor. It is mostly defined for the field of labor economics and theoretical psychology in their content. Wherein in the modern informational society the expansion of the apparatus of the intellectual labor theory is observed because of the increasing creativity concept importance, the information and the educational technology along with intelligence.

The notion of the "intellectual capital" is a base for the economic potential of the specific country. The term "intellectual capital" was firstly used by F. Machlup [4] in 1962 to underline the value of knowledge for the development and improvement of both the human and the state.

Much later in 1993, P. Drucker was interested in this topic. He reflected the concept of the intellectual capital in his work about the state of post-industrial society. The author paid attention on the inevitability of society formation, in which the knowledge plays the prevailing role and the competition shifts to the field of the intellectual capital [5], [6].

According to L. Edvinsson, the national wealth is divided into financial and intellectual capitals, whereas the last ones include human and structural (in particular, market and organizational) capitals. In its turn the organizational kind of the capital is subdivided into renewable process capital [7].

The intellectual labor is a product of the division of labor, both in the past and today that allows demonstrating its historical, social and methodological foundations and mainly creative informational content. The corresponding approach to the intellectual labor is reflected in the Encyclopedias in Economic Theory where the informational component of the intellectual kind of labor is considered to be the principal one.

The intellectual labor results are mostly the material objects including the informational ones. And the essence of such work is explained as finding the labor results of the material expression objective form in the objects of the intellectual property. This necessitates the creation of labor accounting rules, its security; and also defining the life terms of its products. An increasing number of economic networks are using intellectual capital reports such as German "Arbeitskreis Wissensbilanz" as a tool to understand, collect, evaluate and develop their intellectual capital systematically, strenghten innovation potentials and competitiveness of the knowledge based economy [8].

2.2. Education as the the Sourse and Main Component of Intellectual Labor Economy

The specialists traditionally distinguish three leading types of activity that are directly connected with the intellectual labor:

- science and related issues;
- management;
- education.

Thus the education is the most important part of the intellectual labor and its basis on quality of which the general level of economy development and the intellectual labor is dependent. The main peculiarity of the intellectual labor is the specificity of results but not its implementation. Thus, a huge role in all processes of intellectual labor and its further productivity is played by the education level of people who are involved into the intellectual labor, the quality of their skills obtained due to their education and the general qualification.

The human capital contains the knowledge and the level of education of people that gives the possibilities to create new knowledge and to achieve national tasks. Also, it is defined by the *general intellectual potential* of the citizens: they are the specific knowledge on the different questions and the knowledge of the laws, facts and principles. Public knowledge is involved into the technological, informational and communicational systems that are represented by the software and hardware.

The national intellectual potential may be considered as the community of business entities's

potentials formed as the complex of realized working specialists' intellectual potentials.

The intellectual potential of the specialists includes the associations of knowledge, abilities, and perceptions that may bring a new product or service to the creation process.

The intellectual potential formation depends on the educational institutions in the state that are inter-connected with the scientific organizations. This necessitates the investments of both the citizens' financial resources and state funds directed on the education and science [9].

The potential is divided into unrealized and realized. Over the time the realized kind of the potential goes into the intellectual capital with the help of the transition to an intelligent product that is created with the specialists and is recognized as part of the intellectual property. In its turn, the intellectual product may have a material and as well immaterial forms. Wherein the second form is the ideas and knowledge of the specialists that are realized in the process of the production, and they are considered as the important element of the production process.

The potential that exists in the unrealized form is the complex of specialists' knowledge and skills that have not been involved into a production process. The development of the given potential form happens under the influence of the educational system. During the transition of society to informational one the formation of the capital forms may be complicated process that makes a big impact on the economy growth of the country, which has to be admitted in general.

In the most developed countries, investing in education that involves an added expences of the company for a worker, brings benefits. For the completion of the complicated tasks that require a higher level of education employers agree to pay the additional hours spent in the classroom. But situation in countries with transition economy differs due to investment shotages and unfair exploitation policy of most employers that are interested in big fast incomes for themselves, but not in country's and employees' prosperity and well-being.

The "Digital Agenda – 2020", which assumed eGovernance, cybersecurity, interoperability, cloud computing, and social media, will increase the efficiency and reduce the costs of the public sector. Broadband and digital infrastructure services ensure access to Internet equipment and ICT, thus increasing digital literacy. For successful development, maintaining, and creation of the sustain digital innovative public services the novel e-government requires high-level engineers, scientists, and technicians [10].

According to pilot Times Higher Education (THE) University Impact Rankings, 9 of the Top 100 world HEI have incorporated all 17 Sustainable Development Goals into their operating philosophy and practice, only 3 HEIs incorporated all 17 SDGs into their curriculum development. During 2017–2020 less than half of the The World University Rankings Top 100 HEI have published sustainability report in the last three years. Only 43 HEI have implemented education for Sustainable Development Goals into one or more courses offered at undergraduate and postgraduate levels.

3. Brain Drain Problem

3.1. Brain Drain from Higher Education Institutions (HEI) to Business

As Ukraine and as Russia, Slovakia, which is an EU member, has a salary gap between the HEI and the business sector. HEI in Ukraine, Russia, and Slovakia is a part of the public sector with "standard table salaries" that are too low. It leads to brain drain from HEI. At present moment cooperation between different levels of business is weak and need to be established [8].

There is 7% of employment in knowledge-intensive services from total employment in the EU. In Slovakia, this indicator is above 8 % in Bratislava 3 %, the same is elsewhere. Patent activity is below the EU average in the Slovak Republic. In 2016, the Bratislava region had 21 patent applications per million inhabitants; all remaining regions had less than 7, while the EU average is of 93. This is related to the fact that Bratislava spends 1.6 % of GDP on R&D, while other regions spend below 0.7 %. Most Slovak universities, 14 of all 36 of which are allocated in capital city Bratislava, are still only at the beginning of the institutional environment for knowledge transfer into market building process. The number of new-created knowledge-intensive ventures, including manufacturing companies and services, reached the highest value in 2012. They tend to locate not around the regions with a high concentration of the large enterprises, but rather in surrounding regions. Today the process of economic activities' dislocation is observed around Bratislava due to the high real estate costs and transferring of them to the Senec, Pezinok, and Malacky districts [11].

In Russia, the additional factor that leads to the loss of the national intellectual capital is the low remuneration for intellectual workers, too. It is resulted by the transition of the workers of the innovation areas to the commercial structures aiming to provide the worthy salaries. As for the end of 2018, every second Russian citizen (51%) refuted the thesis that without higher education a person is doomed to low-paying and non-prestigious work.

Among young people aged 18 to 34, this proportion is higher (66%) [12].

The Russian universities graduate annually a significant number of the specialists. Currently the Russian law does not provide the Higher Attestation Commission to conduct the PhD unified register. But the analysis of its quantity and structure was done in the statistical scientific and educational collection of 2017 [13]:

- the technic sphere — 231 thousand people;
- the natural sciences — 86 thousand people;
- the jurisprudence — 21 thousand people;
- the medicine — 16 thousand people;
- the agriculture — 11 thousand people;
- the humanity sciences — 13 thousand people.

At the same time, there is a big lack of the young scientists. The average age of a professional who has a scientific degree is 59 . More than 50 % of the doctors of science are older than 60. The young specialists migrate to foreign research centers and Russian commercial organizations. The very important moment is that the institutes' laboratory equipment is old and has the physical deterioration. This does not allow conducting the researches similar to the foreign research centers level. The additional questions appear about the including into the common informational space. The regional institutions are often located on the periphery that hampers useful activities.

The appearance of digital communications and intelligent public services in a customized way could solve periphery institutions' problems. This will keep and attract youth in the rural community to fill the shortages of human capital, especially with new digital skills [10].

3.2. Braine Drain from the Country

Loosing educated human potential is one of the leading reasons for Slovakian, Russian and Ukrainian economy lags. One tenth of university graduates from publicly funded HEI in Slovakia left country for Austria, Czech Republic and other dimentions in the years prior to 2015. Most frequent to emigrate are medicine graduates. At the same time, since 2013 the number of foreign workers in the Slovak labour market had more than quadrupled with almost 60 thousand job migrants from abroad by middle of 2018 [14].

Between 2006 and 2010 the number of graduates in Slovakia was increasing, however, it became decreasing since 2011 due to raising those Slovak students who choose to study abroad [11].

Due to a lack of accurate statistics and the precise term 'highly-qualified professional' it is hard to define the brain drain from Ukraine. In Ukraine during 2004-2006 the numbers of those people who are earning abroad were about 5 to 7 million and their education level is lower than the population employed on the territory of residence. For Ukraine, the average education level lasts 11.4 years. Those Ukrainian labor migrants who were employed in other countries have such high education level as those who spend 12.5 years of studying for migration in UK, 12.3 years – in USA and Canada, 11.8 –in Austria, Belgium, Netherlands, Germany, Luxemburg, France, 11.5 – in Israel; 11 – in Spain, Greece, Portugal; lower than 10.7 – in Russian Federation, Czech Republic, Poland, Hungary, and Slovakia.

The precise number of those qualified Ukrainians who are working abroad and how many of them occupied the market for local lower-qualified workers is unknown. It is only known that 3838 members of academic staff emigrated (including 842 DSci and 2358 PhDs) and 3399 of them left for temporary work and internship. From 1992 till 2002 the 3439 scientists (including 101 DSci and 275 PhDs) left for permanent residency.

The latest big wave of Ukrainians migrants was in 2014 due to economic crash and war with Russia. Since 2014, Poland is a leading beneficiary for Ukrainian economic migration. In 2019, the real wage of full-time employees in Ukraine increased by 9.8% per year. One of the major drivers of wage growth remained a significant shortage of labor.

During 2019, Ukrainians' interest in working abroad has declined, except for finding a job in Germany and Poland. 70% of Ukrainians identified Germany as their preferred destination. Simultaneously, in summer 2019, Ukrainian President V. Zelensky launched a scheme for returning the migrants to Ukraine, and he offered them the cheap business loans for the entrepreneurial class.

In Russia, according to V. Kozlov, the vice-president of the Russian Academy of Science, in the period of the reforms more than 200 thousand people have left the country and the losses from this amounted to more than 1.5 billion rubles. Whereas the total loss over a ten-year period amounted to $70 billion, at the rate of 300 thousand dollars is a loss upon departure of one scientist. The cash losses amounted to $40 billion over 10 years (2007-2017) from the graduates' profession loss because of the impossibility to use their knowledge. According to the FSSS data on December 2017 annually 15 thousand graduates leave Russia [15], wherein the various editions ("Project"), evaluate these indicators as understated in 6 times.

To compensate these processes it is needed to increase the investment volume into the education that is the factor of accumulation and development

of the human capital and the scientific researches as well. The effect of these actions will manifest gradually in the way of increasing the economic growth pace wherein will be created the necessary intellectual reserve that is able to compete with other participants in the global economic system.

4. Comparison of Russian, Slovakian and Ukrainian Economic Readiness for Digital Innovations

In 2018, the World Economic Forum initiated a novel approach that aims to integrate the 4th Industrial Revolution into the definition of competitiveness and emphasized the role of human capital, innovation, and resilience as important features of economic success.

As shown by the Global Competitiveness Index in 2010–2016 years, Slovakia rank was low between EU countries (71st from 148 in 2012) and country was included in the group of "transition economies" in 2013 with rank 78 [16].

In the rating of Transparency International Ukraine in terms of perception of corruption ranked 146 place from 180 countries in 2009.

To see the changes as for the past 2019 and the comparison of three neighboring contries' economies states, we used facts related to the research topic Global competitiveness, Doing Business and Corruption Perception Indeces for Russia, Slovakia and Ukraine (Table 1).

Table 1. Global competitiveness, Doing Business and Corruption Perception Indeces for Russia, Slovakia and Ukraine in 2019 [16], [17], [18].

Country	2019 year
	Global Competitiveness Index (place among 143 countries)
Russia	43
Slovakia	42
Ukraine	84
	Doing Business Index (place among 190 countries)
Russia	28
Slovakia	45
Ukraine	64
	Corruption Perception Index (place among 180 countries)
Russia	137
Slovakia	59
Ukraine	126

As it can be seen, Slovakia is leading among these three countries in terms of perception of corruption. For comparison, the closest to these countries also post-Soviet Belarus ranked 66 in this index [17]. The Slovak Republic has the lowest levels of public trust in the judiciary among EU countries and the fifth lowest in the transition region according to World Economic Forum 2016 Global Competitiveness. Russia is leading in terms of doing business and is right next to Slovakia in global competiveness.

As for Ukraine, the political conflicts with Russia and Slovakia have very substantial effect on country's economy, education and humal resources. Geolocation of Ukraine between EU and Russia has tendency to bring unfavourable consequencies to its citizens.

Slovak interlocutors state: "there is a feeling that their country is perceived by the Ukrainian political elite as a small neighbor, is unable to provide sufficient assistance to Ukraine. Moreover, it is incomprehensible that the former President of Ukraine has never visited Bratislava with a full-fledged visit, as meetings at international venues are not an equivalent substitute. The Slovaks note that many in Kyiv still think that "if they manage to make arrangements with Brussels, Berlin, or Warsaw, Bratislava will support it`". In 2019, the election of the new President of Slovakia and the change of power in Ukraine gave a bilateral cooperation opportunity and increase of interest between Ukraine and Slovakia in addition to the common sympathy to the Pan-Slavism ideas. Russia, in its turn, is perceived by Slovak nationalists as the only ally to become the defender of the Slavs.

Slovakia, Ukraine and Russia are not at the forefront of countries such as UK, Israel, Estonia, Ireland, Sweden, and Australia, where return on investments in digital transformation reach 500%. All three countries still have essential demand in improving transparency of bisnesses, gaining intellectual potential of employees, optimizing work and education processes by developing the digitalization benefits.

Another important index — Economic Potential Development Index (EPDI) is calculated on the UNO initiative since 1990 according to all the countries in the world. According to the calculations, the countries that have more than 80 index points have the high level of the human development and the intellectual potential directed on the economy growth. In 2017, TOP-5 countries were Australia, Norway, New Zealand, Ireland and the United States of America. Russia took the 49th place [19].

This indicates that the essential intellectual capital that may significantly improve the economy in the country and may give a kind of the "scientific impetus" to the education system that currently is not

used properly, and it demands taking the drastic measures on the return of budget support to educational and innovative spheres. If the intellectual capital is the main basis for the new digital system then ignoring this fact reduces successful implementation of the system in general, reducing the competitiveness of the state in the market.

5. State of Digital Economy – Human Labor – Education Correlation

5.1. In Slovakia

The Slovak Republic ranks at 35th out of 188 countries in the 2015 UNDP Human Development Index (HDI). Educational attainment is relatively high, with average years of schooling at 12.2 years and only 0.7 % with no schooling. Public expenditure on education remains below the EU average, with an expenditure-to-GDP ratio at 3.9 %. A tighter labour market incentivises employers to participate in private sector-based training initiatives while activating potential employees. Active labour market policies, inclusive early childhood education, enhancing school-to-job progression with a focus on formal employment, are needed. More than a third of population between the ages of 25 and 64 have higher education in the Bratislava region; this share drops below 18 % in all remaining regions.28 Similarly, above 7 % of adults aged 25-64 participate in education and training in Bratislava; outside this region, this share drops to below 3 %, well below the EU average of 11 %. Moreover differences are in specific education relevant for competitiveness.

In the Slovak Republic for digital integration, the new National strategy ("e-Inclusion") was elaborated. It defines the priority areas for achieving the maximum possible digital integration for socially vulnerable groups and those who are at the risk of digital exclusion. The definition of these areas includes ICT accessibility, inclusive e-Government, enhancing digital literacy and ICT skills, reducing geographical digital divides, promoting cultural diversity and ICT for the elderly [20].

Certain achievements are gained for different categories of disabeled. For example, the Slovak Library for the Blind of Matej Hrebenda had implemented a project entitled the Digital Network for the Blind [20].

The novel long-term strategy in education, research and development was adopded in Slovakia during 2016-2021. It is focused on European countries oriented toward quality top-down endeavour issues on standards, and they are based on several important principles, in particular:

- "look before you jump" principle;
- development of flexibility, communication skills, teamwork, curiosity, adaptability, resilience, planning and organizing. Pilot testing of such novel schools will start in September 2021.
- financial support of FabLab and Makerspace creative workshops;
- support of high quality dual education;
- the SELFIE system (self-reflection on effective learning by fostering the use of innovative educational rechnologies). The pilot test is planed in September 2020, full operation in September 2021;
- DigComp principles (digital skills competence framework). For example, according to the Digital Economy and Society Index (DESI), in 2017, 43 % of the EU population had an insufficient level of digital skills. 17 % had none at all due to not using the internet or barely using. Slovakia ranked 20th in DESI 2017 [21].

But still Slovak exports of knowledge-intensive services were below 60 % of the EU average in 2017. Slovak 15-year-olds reading skills of the PISA index of economic, social and cultural status (ESCS) in 2019 equals 106 points compared to an OECD evarage of 89 points. Still in 2018 the country's number of 25-34 year-olds that attained tertiary education is only 37% compared to 45% in OECD on average. The foundational numeracy skills in Slovakia are strong among EU countries, but problem-solving skills are weak — only 1 of 4 adults in Slovakia has high scores in it [22].

5.2. In Ukraine

In January of 2018, the Cabinet of Ministers of Ukraine approved the implementation plan of the concept for the development of the digital economy and society of Ukraine for 2018-2020. Ukraine is already a part of the digital transformation process: cybersecurity, advanced communication technologies, reduction of international roaming charges with the Eastern partnership countries from and "Digital Partners of Ukraine 2020", digital infrastructure and e-commerce development are being implemented [23].

Ukraine coordinates one of the main focus areas within the Harmonization of Digital Markets initiative – "Telecom Rules" (EU4Digital: Telecom (EaPeReg), and it is also a participant to Eastern Partnership Electronic Communications Regulators Network (EaPeReg) where it chairs the Roaming Expert Working Group (REWG). Work is being held on six priority areas: Telcom rules and infrastructure; trust and security in the Digital Economy; eTrade, which also includes eCommerce, eCustoms and eLogistics; Digital Transport Corridors; Digital skills; ICT research, innovation and start-up ecosystems; eHealth.

In 2016 the number of internet users in Ukraine exceeded 60% and almost 62% of them were adults. In 2017 – 63% (21.35 million users), and in 2018 this number was near 62% - 20.8 million people, in 2019 – 71%. This number among low income users occupies the share of 39% and 66% among below everage income users, being 93–100% among those with above and high income [24]. There is the digital gap in Ukraine due to the inadequate digital using in different areas - equipment, skills, social support etc.

Premier of Ukraine Oleksiy Honcharuk proclaimed the 2020 year as the year of total digitalization of the country and that if the task on it is fulfilled, a plan on increase of GDP of Ukraine by 40% for five years would be quite real.

The Boronos assessment of the digital quality of life in the EU in 2015 showed required progress in the dissemination of digital public services at level 0.39 and the integration of digital technologies into business activities at 0.48. Nevertheless, according to official statistical data by State Statistics Service of Ukraine and Eurostat in 2018 Ukraine did not have this level [25].

5.3. In Russia

Russian Ministry of Education and Science implemented key strands of Industry 4.0 since 2009, which include creating network establishments and integrating them across the entire value chain; building a global wide-band infrastructure comprised of global networks in a high-level relationship between each other; organizing labor at "smart" enterprises. But still, at the end of 2019 year, Russia is behind the countries with developed digital economy and education by about 1.5–2 technological generations, i.e. nearly 20–30 years considering that one generation is 10–15 years long [26].

The challenges of introducing a digital economy in Russia are revealed in works by A.V. Chernovalov, L.R. Baimuratova, V.D. Markova, V. Betelin and S. Kuznetsov. These authours analyze the approaches, implementation principles and performance criteria of the digital economy, examine the interaction system of the market participants in the circumstances of a digital economy and assess the existing system of economic security that is the indispensable element of the digital economy.

Markova gives the understanding of the digital economy and the technology development that provides the introduction of a new type of economy [27].

Baimuratova draws a parallel between general digital literacy at all the levels and strata of society and the effectiveness of introducing the digital economy in general [28].

Khalin and Chernova [29] analyze the digital provision information specifics, identify the risks and consequences of digitalization of the Russian Federation and also highlight the main tasks of digitalization of the Russian economy.

Grammatchikov characterizes the present time as the golden age of the digital revolution, introducing the new technologies into the industrial sector; author evaluates the capital productivity growth and the depreciation of fixed assets [30].

Belyatskaya builds a methodological scheme of digital economy management system, taking into account the national characteristics [31].

The scientific Russian community creates the society concept where the states develop successfully following the innovations, perspective discoveries and inventions. That is why the intellectual potential should remain the most important resource [32].

According to the world statistic the professional education, the Russian Federation is in TOP-10 of the most effective, and this means that 21 Russian HEI are included into the world rate. But it should be emphasized that it considers mostly the Central region institutions. The high level of education is guaranteed in 21 leading institutions of the country that are located mostly in the capital: MSU, MGIMO University and Bauman Moscow State Technical University, etc. In comparison with the USSR, whose level of education was significantly high and the education quality considered not only the state central regions, the Russian Federation educational system is quite weak [16].

Considering the budget of Russia that has been dedicated to education over the past 9 years it may be said that despite the increase in the amount of the budget funds dedicated to education, in 2018 the percentage of allocated funds to the total amount is very small — 3.3.% (Table 2) [33]. Comparing to the USSR in 1960 the percentage of budget funds dedicated by the state on the education was 14.1 % and exceeded defense spending was 12.7%.

Table 2. Budget expenditures of the Russian Federation on education by years

Year	Expenditures in billion rubles
2009	387.9
2010	386.4
2011	552.4
2012	603.5
2013	558.9
2014	499.5
2015	400
2016	398
2017	549
2018	626.29

According to the Federal state statistic service [19] and the OECD [34] data, Russia is behind the leading countries of the world in terms of the science expenditures per year, thus it takes 34th place. The five leaders are the Republic of Korea (4.29%), Israel (4.11%), Japan (3.59%), Finland (3.17%) and Sweden (3.16%). This fact influences badly on the economic potential of the country. However, in accordance with the statistic data [34], Russia is situated on the second place by the quantity of people who have got the higher education in the world.

The state education system of Russia should be considered as one of the main innovative development stimulation factors. After the collapse of the USSR, the educational system, that is distinguished by the traditional practice and aimed at the meeting the needs of the production, is in the complicated state now. The numerous annual changes that are initiated by the higher echelons of the authorities do not bring the desirable effect. The general state educational system (the central regions cannot be an indicator of the education quality) may be characterized as the insensitive to the innovations, with the low level of education, the weak material and technical base and the insufficient salaries for teachers.

The preparation process of the top and middle management specialists in Russia, especially in the industrial and high-tech industries spheres, significantly lags behind the modern scale of the technological production development. The laboratory facilities of many HEI are out of date that leads to the reduction of the interest in the learning process.

The adequate level of digital literacy requires the effective and ergonomic use of ICT and the ability to prevent negative consequences. The high level of the awareness and literacy in digitalization and other areas is a key not only to the individual but nationwide progress [35]. Still, the condition to get higher education or pass professional cources in Russia, as well as in Slovakia and Ukraine is dependent on the material possibilities of a family. Developing digitalization tools helps to overcome this problem due to offering low cost or even being free of charge.

6. Conclusion

Digital economy development is closely linked to human labor potential and mainly to the level of education — higher education nearly always implies higher digital literacy. Every educational process nowadays is very demanding in terms of the ability of both students and pedagogues to make use of digital technologies and ICT in the process of teaching and learning. The pandemic situation in 2020 made this demands much more urgent. The educational system is confronted with a plethora of problems in countries with transition economy such as Slovakia, Ukraine and Russia.

The research revealed number of achievements and crucial problems in these three neighboring contries. The creation of the digital economy will lead to the emergence of the new digital quality of life among Slovaks, Ukrainians, and Russians, but will have induced serious changes in social relations, markets organization, and consequences into the related jobs, skills, security and privacy will appear.

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