

Digital Capital and the Labor Market: Factors of Mutual Influence

G Bannykh¹

¹Ural Federal University, Ural State University of economics, Yekaterinburg 620002, Russia

E-mail: g.a.bannykh@urfu.ru

Abstract. The article discusses issues related to the conceptualisation of digital capital and the mutual influence of it and the labor market in the modern economy. The digital transformations taking place in modern times have significantly changed the living and working conditions of individuals, which is reflected in theoretical studies. The purpose of the article is to assess the possibilities of interconnection and mutual influence of the Russian labor market in the digital economy and digital capital of workers and organisations. Research methods: analysis of theoretical literature, foreign and domestic experience, analysis of statistical data and forecasts regarding the future labor market, made by consulting companies and government organisations. As a result of the study, conclusions were drawn about the existence of mutual relations between digital capital and the labor market, leading to the emergence of new forms of labor (freelance, remote employment), to the disaggregation of organisations and the active use of outsourcing, to the emergence of a new class - precariat, etc. It is assumed that the main factor in the interaction of the labor market and digital capital is the digital divide or the digital divide. The conclusion is made about the need for government decisions in the field of education and employment in order to reduce the digital divide, balance the labor market and create digital capital.

1. Introduction

Researchers evaluate the current stage of development of society from various methodological positions, highlighting its most significant characteristics in accordance with them: "postmodern society", "electronic society", "knowledge economy", "innovative economy", "consumer society", "post-information society" and etc. Information, innovation and knowledge are becoming a determining factor, as well as the most important national resource, which largely determines the welfare of the state and the comfort of citizens.

The information society or knowledge economy has significantly changed the structural elements of human capital and the features of its formation and manifestation, which requires reflection, analysis and practical study of the changes in the new conditions of the digital economy. So, if in the XX century the actual research agenda was the transition of society to a new stage of its development, its various technological and applied aspects, then in the XXI century interest in the informational aspects of human capital began to show.

Indeed, transformational changes in the economy, a change in technological structure have led to the need for changes in the structure of knowledge and skills of subjects of economic activity - "intellectual capital". The formation of new "digital" competencies among individuals engaged in

labor activities has also influenced employment trends. According to the researchers, the digital economy has led to the emergence of new forms of labor (freelance, remote employment), to the disaggregation of organizations and the active use of outsourcing, to the emergence of a new class - precariat, etc.

The purpose of this article is an attempt to assess the possibilities of interconnection and mutual influence of the Russian labor market in the digital economy and digital capital of workers and organizations.

To do this, it is supposed to use methods of analysis of theoretical literature in the theoretical part, and analysis of statistical data, available meta-data on the Russian labor market in the practical part.

The main research questions are:

- How to determine the role of digital capital in changes in the labor market?
- How can the labor market influence the formation and structure of digital capital?
- How to assess the relationship between digital capital and the labor market in the digital economy?

2. Theoretical foundations of digital capital research

In modern social and humanitarian sciences, sufficient attention is paid to the features of human and intellectual capital, as well as its structural components and formation factors. So, in the international Scopus database, on request of "human capital" contains 26,818 results. By the keyword "intellectual capital" – there are 4996 results, with more than 300 articles published within the framework of this topic annually. The key collection of the international Web of Science database on human capital contains 28,733 results. At the request of "intellectual capital" there were 5,366 publications, 400 or 500 annually. In the RSCI, for the keyword "human capital", 25036 results were found, for the query "intellectual capital" - 8371. It can be noted that the interest of both Russian and foreign researchers in the subject of intangible assets and development resources in the era of the digital economy remains high.

However, the topic of digital capital is also beginning to gradually develop. So, there are only 45 articles devoted directly to the phenomenon of "digital capital" in the Scopus database, of which 7 were published in 2017, 8 in 2018, and 5 in 2019. There were 34 such publications in the WOS database (most of them - the same as those indexed in the Scopus). In the RSCI, almost all publications are devoted to the relationship of human capital and its formation with digital technologies in the digital age, while there are practically no conceptual studies devoted specifically to the features of digital capital.

Most of these materials are dedicated to individual digital competencies associated with specific professions or types of work. For example, the materials of De Vuyst, S., Raeymaeckers, K. [1], Njovo, M., Makacha, C. [2], Chachashvili-Bolotin, S., Bokek-Cohen, Y.[3], etc. However, there are also publications aimed at the conceptual definitions and meanings of digital capital. For example, Park S. published a book in 2017 on the study of digital capital, forms of digital inequality, and factors affecting the effective interaction of individuals with digital technologies [4]. Ragnedda, M. Considered the concept of digital capital in its relationship with other types of capital: social, economic, personal, political and cultural [5]. It should be noted that the idea of the relationship between digital and social capital can be found in earlier works [6, 7, 8]. This interaction helps people transform digital resources into resources and take full advantage of the Internet.

The impact of digital capital on business development was assessed by Bughin, J., Manyika, J. [9], Clermont, P. compared digital capital in doing business with information advantages and even excellence [10].

Some researchers put digital capital in direct correlation with the problems of the individual's social isolation in modern society. Thus, A.Bach, G.Shaffer and T.Wolfs believe that a detailed study of the holistic concept of digital human capital is necessary, taking into account the complex nature of social isolation in the information age. Management decisions aimed at digital inclusion are needed, which,

in turn, can lead to a variety of media ownership, digital literacy and training for participants to create meaningful content [11].

Connects the idea of digital capital and digital inequality with S. Park - he explores how the user's digital ecosystem leads to new forms of digital inequality, i.e. an individual who has the opportunity, material and physical, of interacting with digital gadgets, receives a certain kind of experience, which is subsequently transformed into digital competencies and advantages, giving it a higher status in the "digital era" compared to an individual who did not have such opportunities [4].

Paino and Renzulli propose introducing a new category of digital capital in the measurement of cultural capital. Based on research in kindergarten and elementary school, the authors propose a comprehensive model in which teachers play an outstanding, mediating role in the impact of computer skill on academic performance [12]. M. Ragnedda defined digital capital as the accumulation of digital competencies (in the field of information, communications, security, content creation and problem solving) and digital technologies both in the individual and organization, and in society as a whole [5]. Its constant transmission and accumulation, as a rule, preserve social inequality.

Despite the growing interest in the concept of digital capital, it should be noted that many aspects of this phenomenon remain unexplored, including there is no single interpretation of the concept itself. In this article, we will adhere to the following understanding of digital capital - this is the process and result of an economic entity acquiring experience in a digital environment using digital technologies. Digital capital can be considered at several levels: the macro level (characteristic of digitalization and digital transformation of the state), the mesoscale (use of digital technologies by organizations) and the micro level (as an individual characteristic). At the state level, these are primarily demographic properties, characteristics of education, culture, and health care. For enterprises, digital capital is valuable in the form of professional characteristics or digital competencies. Digital capital at the personality level is the accumulated experience of interaction in the digital environment, effectively used to generate income.

The formation of digital capital can be carried out sequentially: it is based on the potential opportunity to access and use the Internet, as well as digital technologies, followed by the accumulation of knowledge and skills in the digital environment. And at the last stage of formation, the individual, taking into account his own characteristics and capabilities, already accumulated capital, transforms him into social, cultural, economic, etc.

In connection with this understanding of digital capital, the labor market is just the last stage (in modern Russia) of the transformation and formation of digital capital, i.e. the level of accumulated knowledge and competencies in the digital sphere is used both by a potential employee in choosing the form, type and place of employment and employment, and by a potential employer in forming requirements and assessing the abilities of future employees. In the context of the digital economy, the demand for labor is significantly increasing with a certain level of digital competencies. The most universal, i.e. digital competencies necessary for everyone become a unit of measuring the competitiveness of both the employee and the economy as a whole.

At the same time, the content of the digital competencies themselves, the issues of their formation, etc. remain debatable both in science and in practice. Most often, they mean ownership of computer and Internet technologies, but their real content is much wider. Consider the features of the labor market in a digital economy and how the digital competencies that underlie digital capital change it.

3. The main changes in the labor market in the era of the digital economy (forecasts and figures)

The digital economy entails a change in the structure of employment, the death and alteration of the labor content of traditional professions, the emergence of new types of employment and types of professional activity, the need to change several types of professional activity during a career, high professional mobility, the emergence and growth of precariats.

We will try to determine the mutual influence of digital capital and the labor market. First of all, this is the nature of interactions between workers with different skill levels and digital technologies

that influence the demand for labor [13]. Digital technology not only helps the employee, but can completely replace him. A significant substitution of manual labor is primarily a threat to those industries in which there are no requirements for the education, qualifications or age of workers.

According to a study by The Future of Jobs, by 2020, 2 million jobs will increase in the global labor market, with 7.1 million disappearing [14]. In 2030, the approximate release of jobs worldwide through robotics will be more than 20 million, in the European Union (28 countries) - more than 2 million [15].

D. Autor believes that the effect of “technological unemployment” due to the widespread transition of production to automation will be subject to secondary workers due to economic feasibility, as specialists with this level of education are quite well paid [16].

According to McKinsey, by 2030 up to 50% of work operations in the world can be automated, and the scale of this process will be comparable to the industrial revolution of the XVIII-XIX centuries. [17] The specialists of this international consulting company believe that in the coming years it will be completely possible to automate only 5% of existing professions, due to the high cost of a modern production robotic mechanism. The remaining 95% of specialties are only subject to partial implementation of technological innovations.

Nevertheless, it is now unambiguously possible to predict the release of low-skilled labor, since it is precisely such jobs that will be primarily automated and replaced by robots. In Russia alone, in 2018, the total number of introduced industrial robots in 2018 amounted to 860 pieces. (According to the report of the National Association of Robotics Market Participants, there are 5,000 robots in operation in Russia, which is 4 robots per 10,000 employees [18]. The level of robotisation in the industry is quite low, but this only means further accelerated robotisation and an ever faster release workers.

Thus, the labor market due to technological changes and the accumulation of digital capital will be characterized by a large number of unemployed and this type of unemployment is structural. In 2019, the unemployment rate in Russia reached 4.9% [19], which is relatively low compared to other countries, however, the regional and settlement sections of unemployment indicate ongoing transformations. In the largest cities, the unemployment rate is much lower than in medium and small cities or in rural areas. Here you can also trace the impact of digital capital and the digital divide - the less “digital opportunities” people in rural areas have, the less opportunities they have for realizing in the labor sphere. In addition, the labor market in the Russia is characterized by the number of unemployed with higher education is growing. The impact on this can be exerted by the acceleration of digital transformations, and the low level of readiness of Russians for the digital economy and digital society.

However, the mutual influence of digital capital and the labor market leads to positive consequences - the emergence of new professions and new jobs, an increase in the need for highly qualified personnel with constant professional development, a decrease in time standards, and the emergence of a need for continuing education. So, for example, according to analysts, unemployment will increase to 20-25% over the next 20 years due to the replacement of mass spheres of employment. However, the need for experienced personnel with higher education, on the contrary, will increase

Among the researchers who were the first to study the consequences of globalization and technologisation, P. Bourdieu and R. Castell - those who drew attention to the loss of stability in labor relations between workers and employers, informal and non-guaranteed employment [20]. Today, a new class of employees has been formed who are partially, temporarily or informally employed - the precariat. In many cases, the automation of enterprises, individual actions and operations leads to the release of jobs and those who have low digital capital, are in the ranks of precariat.

The precariat stably delivers informal employment, that is, any kind of employment relationship based on an oral arrangement. The share of employees in the informal sector in Russia increased in 2018 and amounted to 20.1% of the total number of employees aged 15 and over (14.6 million people) [21]. According to the Center for Social and Political Monitoring of the Institute of Social Sciences of the RANPEA, 30 million Russians are included in the shadow labor market (more than 40% of the

economically active population), of which 21.7 million are those who are additional to the main place work unregistered earnings or receive part of the salary informally, in "envelopes".

The real number of informal employment in Russia is quite difficult to assess, but in any case this is a very high indicator. However, the risk of being in the precariat group, potentially existing in all social strata, nevertheless, varies greatly depending on the membership of one or another of them. So, for highly qualified specialists (professionals), the risk of precarization is generally lower than that of other categories of workers [22]. Experts point to an interesting phenomenon - the inverse correlation between educational level and ease of employment [23].

Not so long ago, the Russian Federation decided to reduce the number of the informal sector of employment by introducing the status of "self-employed". "Self-employed" is an individual who independently carries out activities at his own risk based on personal labor participation in the provision of services, the performance of work for individuals, aimed at the systematic receipt of profit, not registered as an individual entrepreneur, without employees. There are two types of self-employed:

1. those who actually organize a small business (but are not legal entities, that is, do not have the right to hire employees), attracting employees for the sake of profit, renting equipment and premises, providing services both privately and informally working with organizations. In this case, we can still observe the result of the interaction of digital capital and the labor market - the emergence of such technology as outstaffing (staff rental).

2. those who perform work for individuals only to satisfy personal needs, therefore spending the income received on personal needs. In this category, it is necessary to note such an option of labor self-realization, which has received tremendous development just in the conditions of the digital economy - freelance. In 2018, about 800 thousand freelancers registered on digital platforms in Russia in Russia, compared with 2017, there was an increase of more than 1.5 times [24]. Those freelancers who work directly with digital aggregators and platform freelance solutions are most successful in self-realization of labor and personal income extraction. And this clearly shows the dependence of the freelance market on the level of digital capital. Associated with freelance and outstaffing are such forms of employment as distance. Distance employment is the most popular option for outsourcing. The consequences of distance work are a high proportion of international outsourcing, which expands the employer's ability to select an employee for the job, but increases the requirements for the qualifications and competencies of job seekers.

Another area of the mutual influence of digital capital and the labor market should be highlighted - this is the speed of digitalization, the digital transformation of the economy and society as a whole. It is quite large and the digitalization process will accelerate exponentially, which in the near future will entail a shortage of personnel in new professions or a change in competencies within existing qualifications. The priority factor in influencing the interaction of the labor market and digital capital in this case will be the education system - the extent to which the formation of digital competencies is included in educational programs at various levels, the organization of training for older workers, directly affects the digital characteristics of job seekers in the labor market.

According to the Federal State Statistics Service, the share of Internet users in the total population in 2018 amounted to 80.9% [25]. Today, digital skills and competencies in the education system begin to be mastered from 7-8 years, in the system of additional education - much earlier. To increase the digital competencies of citizens of older age categories, the national projects "Computer Literacy", "Financial Literacy" and "Unified Internet Lesson" were launched, informing about business projects and startups with state support, etc. S.N. Kostina and G.A. Bannykh believes that the information inequality between age groups is mainly associated not with the difference in access to ICT (purchase of communication devices and services, including the Internet), but with the willingness and ability to fully use them [26]

According to the ROCIT study, most Russians are not confident in their knowledge of the digital economy, phishing, and aggregators of goods and services. However, at the same time, the digital

literacy index increased by 5.7% to 5.99 points out of 10, and the digital competencies subindex showed a special growth, reaching 6.84 points in 2017 [27].

In 2017, 1,050.3 thousand people were employed in ICT professions, of which 829.4 thousand were specialists with higher education, 220.9 thousand people were specialists with a secondary level of qualification. More than half of all those employed in ICT professions are software developers (44%) and system administrators (11%). Almost a third (27%) of those employed in ICT professions are concentrated in units whose activities are associated with the use of computer technology and information technology. The second largest group operates in manufacturing (12%), the third in transport and communications (10%) [28].

The transfer to digital technologies of a part of production processes will require employees to acquire new skills as the content of their labor functions changes, and the lack of a sufficient number of workers with the necessary skills on the labor market will give enterprises a greater incentive to collaborate with universities that provide the possibility of additional professional education.

The digital economy requires the constant impact on the labor market of a large number of specialists in the IT field. According to official estimates, there is a staff shortage in the Russian IT sector. But proper technological groundwork can be ensured if a million specialists are involved in the field of information technology. In accordance with the Digital Economy program, the number of university graduates in areas of training related to ICT will increase to 120 thousand people a year. The number of graduates of higher and secondary vocational education who have competencies in the field of information technology at the global average level will amount to 800 thousand people annually.

5. Conclusion

As a result of the study, the fundamentals of studying and conceptualising such a phenomenon as “digital capital” were considered. Despite a certain attention to his research among specialists in the social sciences and humanities, it is necessary to note the lack of a clear understanding and interpretation of its content. Digital capital is the process and result of the acquisition by an economic entity of experience in a digital environment using digital technology. Digital capital can be considered at the level of state, organization and individual. In the formation of digital capital, three stages are distinguished, allowing, as a result, the individual to transform it with a certain measure of success into social, economic capital, etc. It is proposed to consider digital competencies as the core of digital capital, that is, a combination of knowledge, skills and abilities in the field of digital technologies.

Digital capital and the market in a digital economy have a serious impact on each other: the market structure is changing and the sought-after digital competencies are being improved. As a result of the study, the following factors of mutual influence were identified: this is the nature of the interactions between workers with different skill levels and digital technologies that affect the demand for labor and the speed of digitalization, the digital transformation of the economy and society as a whole. In the first area, structural unemployment and employment are changing, precariate is appearing, and forms of employment are expanding (freelance, outstaffing, outsourcing, remote). In the second direction, there is a need for flexible work, continuous training and retraining, the need for changing educational conditions and adaptation. The traditional economy trained specialists to choose one profession for life; in the digital economy, the most important quality is the diversity of “capitals”, the driving force of which is digital capital.

The most important condition for the interaction of the labor market and digital capital is digital inequality. In Russia, at the state level, decision-making in the field of education and employment is required to reduce the digital divide, balance the labor market and create digital capital in accordance with the requirements of the digital economy.

References

- [1] De Vuyst S and Raeymaeckers K 2019 Is Journalism Gender E-Qual? A study of the gendered

- accumulation and evaluation of digital capital in journalism *Dig. Journ.* **7 (5)** 554 -70
- [2] Njovo M and Makacha C 2018 Cultural capital, digital capital and stakeholder partnerships: A holy trinity for a sustainable cultural tourism trajectory *Afric. Journ. of Hosp., Tour. and Leis.* **7** 5 13
- [3] Chachashvili-Bolotin S and Bokek-Cohen Y 2017 Digital capital as a mobility channel for ethnic minorities *The Dig. Div.: Iss., Rec. and Res.* 133-59
- [4] Park S. 2017 *Digital capital Digital Capital* (London: Palgrave Macmillan) p 247
- [5] Ragnedda M. 2018 Conceptualizing digital capital *Telemat. and Inform.* **35** 8 2366-75
- [6] Bourdieu P. 1986 *The forms of capital* (New York: Greenwood) 241–58
- [7] Coleman J S 1988 Social capital in the creation of human capital. *Amer. Journ. of Sociol.* **94** 95–120
- [8] Putnam R 1995 Tuning in, tuning out: The strange disappearance of social capital in America *PS Polit.Sc. and Polit.* **28(4)** 664–83
- [9] Bughin J and Manyika J 2013 Measuring the full impact of digital capital *McKins. Quart.* **4** 88-97
- [10] Clermont P 2017 Information superiority Digital capital? *Cut. Bus. Techn. Journ.* **30** 2 12-7
- [11] Bach A, Shaffer G and Wolfson T 2013 Digital Human Capital: Developing a Framework for Understanding the Economic Impact of Digital Exclusion in Low-Income Communities *Journ. of Inform. Pol.* **3** 247-66
- [12] Paino M and Renzulli L A 2013 Digital Dimension of Cultural Capital: The (In) Visible Advantages for Students Who Exhibit Computer Skills *Sociol. of Educat.* **86(2)** 124–38
- [13] Goos M 2018 The impact of technological progress on labour markets: Policy challenges *Oxf. Rev. of Econ. Pol.* **34** 3 362-37
- [14] The Future of Jobs Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution 2016 Global Challenge Insight Report World Economic Forum 2016 http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf
- [15] Oxford economics 2018 How robots change the world. What automation really means for jobs and productivity from: <http://resources.oxfordeconomics.com/how-robots-change-the-world?source=recent-releases>
- [16] Autor D and Salomons A 2017 *Robocalypse Now – Does Productivity Growth Threaten Employment?* from: <http://conference.nber.org/confer//2017/AIf17/Autor.pdf>
- [17] Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages 2019 McKinsey Global Institute <https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages>
- [18] Research by NAURR "Industrial Robotics in Russia and the World" 2019 National Association of Robotics Market Participants <http://robotunion.ru/en/analitika/dokumenty>
- [19] Employment and unemployment in the Russian Federation in january 2019 Federal State Statistics Service http://www.gks.ru/bgd/free/B04_03/IssWWW.exe/Stg/d04/34.htm
- [20] Castell R 2009 Metamorphoses of the social issue Chronicle of wage labor (St. Petersburg: Aletheia) p 557
- [21] Labor force survey Federal State Statistics Service http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1140097038766
- [22] Druzhilov S A 2015 The precariat and informal employment in Russia: socio-psychological aspects *Humanit. res.* **1** 45-54
- [23] Goliusova Yu V and Ivaschenkova N V 2014 Over-education in Russia: socio-economic consequences *Theor. and prac. of soc. devel.* **18** 25–31
- [24] Freelance market analysis: numbers, money and trends of 2019 Retrieved august 2019 <https://vk.com/@kopyraitingevgeny-analiz-rynka-frilansa-cifry-dengi-i-trendy-2019-goda>
- [25] Percentage of Internet users in the total population of Russia Official portal of the Federal State Statistics Service Retrieved from:www.gks.ru >free_doc> new_site >business> mon-sub >2.6.9.xls
- [26] Bannykh G A and Kostina S N 2014 Information inequality as a factor in the formation of the

information culture of the residents of the Sverdlovsk Region *Proc. of V Ural Demographic Forum* (Yekaterinburg: Institute of Economics, Ural Branch of the Russian Academy of Sciences) pp 447-451

- [27] Digital Literacy Index 2017: All-Russian research by ROCIT 2018 http://xn--80aaefw2ahcfbneslds6a8jyb.xn--p1ai/media/Digital_Literacy_Index_2017.pdf
- [28] Personnel for the digital economy 2018 Forbes <https://issek.hse.ru/news/220069291.html>