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Impact of Budget Investment on Labor Productivity in Resource Models of Intellectual Capital (on the Example of Russian Regions)*

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ABSTRACT

This paper investigates the influence of budget investment in intellectual capital on labor productivity in Russian regions. The study shows that investments in fixed assets of the education sector, investments in the creation of new information technologies, investments in the field of research and development (R&D) directly related to human intellectual activity can be considered as the main areas of investment that form the intellectual capital of the region, and also as resource factors of economic growth in addition to the basic factor - the dynamics of the capital-labor ratio. Econometric models of the influence of private and budget investments in fixed assets (including federal and regional), investments in ICT, education and R&D on labor productivity, built using the production function and panel regression, are based on data for 85 constituent entities of the Russian Federation for 2017-2019 years, presented on the websites of the Federal State Statistics Service and the Unified Interdepartmental Information and Statistical System (EMISS) of the Russian Federation. The results of modeling showed the significant impact of budget investments in ICT, as well as training and retraining of personnel on labor productivity in Russian regions.

INTRODUCTION

The recovery and acceleration of economic growth rates of national and regional economies during the period of overcoming the crisis trends caused by the spread of coronavirus infection and related restrictive measures require new economic solutions. The main reasons for the decline in business activity indicators in 2019-2020 are usually attributed to (Carlsson-Szlezak et al., 2020; Ozili and Arun, 2020; Spash, 2020):

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- decrease in international and interregional trade;
- suspension or severance of international economic ties, including the "freezing" of joint projects, due to restrictions imposed at the interstate level;
- reduction in the volume of passenger traffic;
- decrease in consumer demand in tourism, public catering, and consumer services;
- a sharp decline in the number of clients in the entertainment industry (sports, fitness, cinema, theater, etc.);
- an increase in unemployment, etc.

All the listed reasons and measures to neutralize their negative consequences have been repeatedly discussed and continue to be the objects of the closest attention at the international, national, and regional levels, as well as in specialized literature. In the last year alone, scientific periodicals have seen a sharp surge in the number of economic publications devoted to coronavirus issues (Iacus, 2020; Hüther, 2020; Laing, 2020; Maneenop and Kotcharin, 2020; Nicola et al., 2020; Rubinskiy and Sindeev, 2020; Sarkodie and Owusu, 2020; Zenker and Kock, 2020). However, in addition to the listed reasons for the decline in business activity, we would like to highlight another one that plays a key role in ensuring economic growth - the outflow of investments in fixed assets. So, according to the official data of Rosstat in the Russian Federation at the end of 2020, the volume of investments in fixed assets decreased by 1.4% compared to 2019 (EMISS, 2020).

Among other reasons, two main factors influenced the fall in the volume of investments in fixed assets in the Russian Federation. The first is the revision of the investment programs of companies that, before the introduction of coronavirus restrictions, planned to expand or update the material and technical base, including through accumulated reserves and retained earnings of previous years. The main efforts of company management in the context of the COVID-19 pandemic were aimed at preventing disruptions in production, retaining staff, and, in fact, the survival of the business. The existing financial reserves were redistributed to fulfill these tasks, which negatively affected the volume of investments.

The second is a sharp outflow of foreign investment from the Russian sectors of the economy. Thus, according to the Central Bank of the Russian Federation, at the end of 2020, direct investments of non-residents in the non-banking sector of the Russian economy amounted to $ 1.4 billion, which is 21 times less than in 2019 ($ 28.9 billion - Bank of Russia, 2020).

The drop in investment activity has the strongest negative effect on the capital-labor ratio in the real sector of the economy, suspends or significantly increases the terms of modernization of production, which leads to a slowdown in growth or even a drop in labor productivity. Considering the business activity of organizations as a complex and dynamic characteristic of the effectiveness of economic activity and the use of economic resources, labor productivity should be singled out as a key indicator characterizing the use of the resource base, along with capital productivity and yield of capital investments. The efficiency of the use of labor resources during the economic downturn decreases faster than other resource indicators, since labor costs are one of the most protected items of expenses of organizations, and staff reduction leads to the emergence of additional social obligations to laid-off workers. And in the context of nationwide measures to prevent the spread of coronavirus infection, lower wages and staff cuts contradict state and regional imperatives to curb crisis trends in the economy. Thus, in the current situation, new mechanisms are needed to curb negative trends in the economy, leading to a decrease in labor productivity. And here the internal and poorly used reserves of growth, available in the labor resources themselves, come to the fore. We are talking about the intellectual capital of a working person as a part of his economic potential, due to the presence or possibilities of acquiring new knowledge and competencies that allow him to increase the efficiency of his labor activity. Of course, a person can realize his economic potential inherent in intellectual capital only if such opportunities are in demand in his organization or the regional labor market, the creation of which requires additional investment.

This situation could not but provoke retaliatory measures from the leadership of the Russian state. On July 21, 2020, Russian President Vladimir Putin signed Decree No. 474 "On the national development goals of the Russian Federation for the period up to 2030". According to this document, "the real growth of investments in fixed assets in the Russian Federation by 2030 should be 70% against the indicator of

2020". It is easy to calculate that to achieve this indicator, taking into account the annual capitalization of interest, investments in fixed assets on average must increase by 5.5% per year. At the same time, according to Rosstat, in the pre-crisis period from 2017 to 2019, capital investments in the Russian economy in comparable prices increased annually by 4.5% on average. With the fall of the investment indicator in 2020 by 1.4%, it turns out that in addition to the restoration of the pre-crisis level of investment activity in the Russian Federation, it will be necessary to carry out a significant amount of measures to improve the investment climate and attract additional investment. In this regard, a significant role will be played by budgetary funds, directly or indirectly allocated for investment purposes.

It should be noted that despite the large number of works devoted to the study of intellectual capital (Buenechea-Elberdin, 2017; Medina et al., 2007; Markhaichuk and Zhuckovskaya, 2019; Nitkiewicz et al., 2014; Trequattrini et al., 2018) and the relationship between intellectual capital (mostly between its elements, namely human capital) and labor productivity (Benos and Karagiannis, 2016; Chalfin et al., 2016; Chang et al., 2016; Chojnicki and Rabesandratana, 2018; Markhaichuk and Panshin, 2020a, 2020b; Mellander and Florida, 2021; Onkelinx et al., 2016), the issue of budget investment in human intellectual capital remains insufficiently covered, which has led to the relevance of this study.

The hypothesis of the study is that targeted budget investments in the intellectual capital of the region can partially neutralize negative trends in the economy and contribute to an increase in labor productivity. The purpose of the study is to assess the impact of budgetary sources of investment on the dynamics of labor productivity in resource models of the intellectual capital of Russian regions.

1. THEORY AND METHODOLOGY

Budget investments, regardless of the level of the budget system (federal, regional, municipal), in our opinion, are a significant incentive for activating the development processes of certain industries and areas of economic activity, as well as specific territories. This is due to the proportional attraction of private investment, the creation of new jobs, the development of infrastructure, which, accordingly, have a positive effect on economic growth and, in particular, on labor productivity. However, the extent of this influence varies.

It should be understood that labor productivity is the same complex and multiplex characteristic as any other indicator of socio-economic development. Only, unlike most other economic values, it is inherently initially averaged, since it is determined per one person-period. And without a qualitative assessment of the factors affecting labor productivity, the interpretation of quantitative values can greatly distort the real picture. This situation is most clearly manifested in everything related to investments aimed at increasing labor productivity. If funds are used to modernize and re-equip production, that is, to increase the capital-labor ratio, then labor productivity growth occurs predictably and relatively quickly. If investments are directed to the development of human resources and an increase in intellectual capital, then the return has to wait longer, and it is not always directly related to the volume and timing of investment. In this regard, regional budget investments come to the fore, which can be focused on obtaining longer and cross-cutting effects within the territory as a whole.

In the context of a high level of economic federalization in Russia, the emphasis on the regional level of investment decision-making is due to several circumstances. In his study of the impact of budget investments on economic growth rates, Belov (2018) confirms that regional investments stimulate economic growth more efficiently than federal ones. Indeed, federal budget investments in large projects implemented in various regions can have an ambiguous and even multidirectional impact on the dynamics of regional economic growth.

On the one hand, any budget investment attracts private companies as an opportunity to use the funds of investment projects as a resource base for financing current operating activities. Moreover, the need to meet the requirements for contractors often leads to the implementation of private capital investments in the development of their material and technical base. The federal investment projects themselves are mainly aimed at solving social or infrastructural problems (Kosov, 2019), ensuring the implementation of state functions in a particular territory. However, when implementing federal-level

investment projects with budget financing in the region, organizations from other regions or even foreign companies can be selected as contractors. Local firms may simply not match the scale of a federal investment project. Thus, its impact on business development in the region of implementation may be negligible or absent.

The influence of large federal investment projects on the regional labor market should also be recognized as ambiguous. On the one hand, during the project implementation period, additional and well-paid jobs are created in the region with wages higher than the average for the region. On the other hand, this causes a sharp outflow of qualified personnel from specialized enterprises in the region and a shortage of specialists for the implementation of similar, but smaller-scale regional projects. This effect is most clearly manifested in the field of road infrastructure when the construction of federal highways across the territories of Russian regions causes significant imbalances in intraregional labor markets.

The picture is even more interesting after the completion of a large federal investment project in the region. Qualified specialists involved in its implementation and receiving high wages often do not want to return to their previous jobs and move to other regions, including those where similar large projects are being implemented. Two scenarios can be considered to preserve human resources in the region. The first is associated with an increase in the current expenditures of regional, municipal and private companies on wages, which in general will negatively affect business efficiency and significantly increase the financial burden on the regional budget system. In addition, we should expect an exacerbation of imbalances in the regional labor market, provoked by the outflow of personnel from industries and spheres with lower average wages.

The second scenario initially assumes additional budgetary funds to be directed not to increasing current expenses, but to investing in the development of regional intellectual capital, which will make it possible to quickly and promptly replace staff with new young or re-qualified specialists. A difficult moment in the implementation of investment projects with federal funding on the territory of the region is the transfer of the created object, whether infrastructural or social, for service and maintenance at the expense of regional and local budgets. Accordingly, the load on them increases, and the possibilities for financing measures to stimulate the economy decrease.

Financing the same or similar projects through regional budget investments is much more in line with territorial interests, both social and commercial. This is due to the understandable orientation of the regional customer to use, first of all, their economic potential in the implementation of large projects. And it is in this scenario that the regional business becomes more interested in investing their own funds in the development of their operating activities. The very intellectual capital of the region, as a set of mental capabilities of the able-bodied population to obtain and use knowledge and competencies, allowing to ensure and improve the efficiency of their labor and economic activities of economic subjects of the territory, should be considered in at least three aspects.

A. The competency portfolio of people living in the region, which is initially formed in the field of education, is increased and modified in the process of labor activity, including through the system of professional retraining and advanced training. Thus, the educational system with all its levels and forms of implementation plays a key role in creating the intellectual capital of any territory. Good basic education creates a foundation for a person to freely choose a profession and provides an opportunity for continuing education throughout his life, which, if necessary, allows him to retrain for new opportunities in the labor market. High-quality vocational and higher education not only provides the labor market with specialists with competencies in demand at the moment but also, taking into account the possible trajectories of technology development and the areas of application of knowledge and skills, forms a new market for promising professions with a new level of labor productivity. Intensive and flexible retraining and advanced training programs allow to quickly adapt employee competencies to new professional challenges.

B. Knowledge infrastructure as a system that accumulates the information a person needs and provides the basic knowledge management processes: obtaining, reliable storage, identification, systematization, and classification of information, as well as its efficient and effective use. The presence in the region of a complex of information systems that contribute to socio-economic development is currently one of the most important factors in increasing labor productivity. This positive impact is due to the following manifestations of digitalization of labor activity:

- the total saving of employees' time for search, processing, and exchange of information necessary for professional activity;
- the reduction in the number of manual and non-automated operations due to their transformation into digital form;
- the emergence of the possibility of remote work using modern information technologies;
- the creation of new digital opportunities for workers for the simultaneous (parallel) execution of several production or service operations, which leads to a reduction in the duration of the production cycle and savings in working time, etc.

Thus, the second aspect of the development of the region's intellectual capital will be the level of digitalization of the economy, and, in particular, labor activity.

C. The level of the added value of products (services) produced in the region is largely due to the relevance and progressiveness of the technologies used in production. The modern consumer, including thanks to modern information technologies, prefers the most modern, technological, functional and safe products, the production of which requires the constant generation and implementation of innovative solutions. The presence in the region of support systems for scientific, technical, and promotional activities is one of the key factors in ensuring the competitiveness of products. Let us single out three groups of budget investments carried out in the region, according to the degree of their influence on attracting private investment and economic growth (Figure 1).

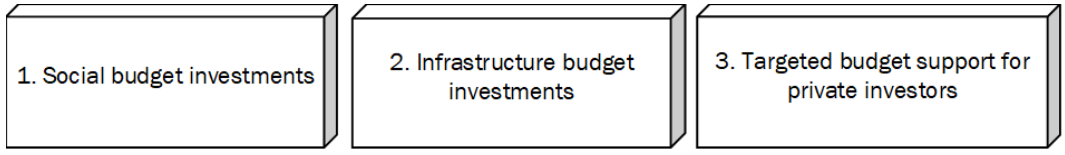

Figure 1. Groups of budget investments according to the degree of their influence on attracting private investment and economic growth

Sourse: own elaboration

Let's consider these groups in more detail.

A. Social budget investments. The acquisition or construction of social facilities at the expense of budgetary funds is associated with the implementation of the social function of the state but has little impact on the accompanying private investment. They will be associated with the subsequent commercial maintenance of the new social object (supply, catering for people, utilities, etc.). If the utility power of the service companies is sufficient to increase the volume of work without additional capital investments, then the influence of social budget investments on attracting private ones is practically absent.

As applied to the analysis of the region's intellectual capital, social budget investments will directly include investments in the fixed capital of the education sector. The economic effects of such investments are deferred and are primarily associated with the impact on the quality of training specialists for the labor market and, as a result, on productivity gains.

B. Infrastructure budget investments are considered the most balanced to stimulate the economy, for several reasons.

The first one is related to the fact that investments in infrastructure facilities directly solve the problem of improving the quality of life of citizens, convenience of doing business and other types of economic activity. For example, the construction and modernization of roads increases the accessibility of new territories both for public contacts and for doing business. New markets for products and opportunities for the provision of services are opening up. Gasification of settlements improves the quality of life of the population and creates new opportunities for doing business, etc. The second reason is due to the direct influence of infrastructure facilities on the size and cost structure of a business. A well-developed road network and high-quality roads lead to a reduction in logistics costs, both by reducing the delivery time of

goods, and by directly saving on fuel and lubricants, repair and maintenance of vehicles. The availability of power supply networks reduces business costs for connecting and generating the required energy, etc.

In the context of considering the intellectual capital of the region, taking into account current trends, the most promising type of infrastructure budget investments can be considered investments in the creation of new information technologies. Budget investments in the digitalization of the economy generate many economic effects, both in the long term and in the current period. The third reason is the creation of new business around new or modernized infrastructure facilities. Indeed, transport hubs and highways, as well as other infrastructure facilities, due to their high load by potential consumers of goods and services, are becoming a demanded object for private investment. Thus, infrastructure budget investments have a strong both direct and indirect impact on the investment attractiveness of the region.

C. Targeted budget support for private investors in the region is the most difficult and responsible for making decisions and is either stimulating or compensatory. This group of budget investments can include:

- creation of separate investment sites to attract specific private investors;
- organization of investment parks for a large number of different investors;
- financing of research and innovation activities in the region;
- compensation of a part of interest rates on investment loans;
- reimbursement of part of the previously incurred investment costs of private investors, etc.

All the listed mechanisms of targeted budget support require competitive procedures and the organization of control over the targeted use of budget funds. However, it is this group of budget investments that is the greatest incentive for attracting private investment to the region. Concerning the research of intellectual capital, the most interesting is the targeted support of investments in the field of research and development (R&D). Thus, in the course of considering the groups of budget investments in relation to the issue of forming and increasing the intellectual capital of the region, three key areas of investment were identified (Figure 2).

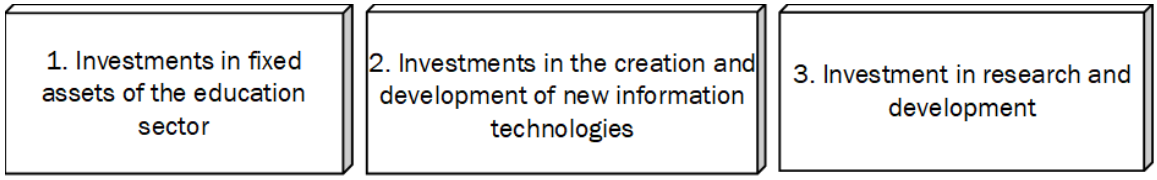

Figure 2. The main directions of investments that form the intellectual capital of the region

Sourse: own elaboration

All three listed areas of investment are directly related to the intellectual activity of a person, which allows them to be considered as resource factors of growth in addition to the basic factor - the dynamics of the capital-labor ratio.

To study the influence of budgetary sources of investment on the dynamics of labor productivity, it is necessary to develop resource economic models, which are characterized by:

- the choice of indicators characterizing the impact of one or more economic resources on the resulting indicator;
- the assessment of the local and/or multifactorial impact of resources on the change in the result and, accordingly, the initial absence of a requirement for the complexity of the model;
- the analysis of the mutual influence of resource indicators when they are included in the model;
- the construction of resource indicators in a single measurement system to ensure comparability, either through growth rates, or using financial indicators.

The statistical reporting system used in the Russian Federation makes it possible to differentiate the total volume of regional investments in fixed assets in the context of budgetary and non-budgetary funding sources. However, more specific statistical indicators characterizing investments in the development of intellectual capital, for their use in resource models, require a separate justification. For example, the indicator "Expenditures on information and communication technologies in the reporting year" (hereinafter - ICT), being one of the key indicators for assessing the intellectual potential of the territory, reflects the total costs, including capital and current, for the development, acquisition, implementation, and use of ICT. Separate statistics indicating the share of ICT capital expenditures in their total volume are not compiled. Moreover, according to the adjusted Rosstat methodology, it has become more difficult to distinguish capital and operating costs in the structure of internal costs for ICT in the Russian Federation at the end of 2019 (Figure 3).

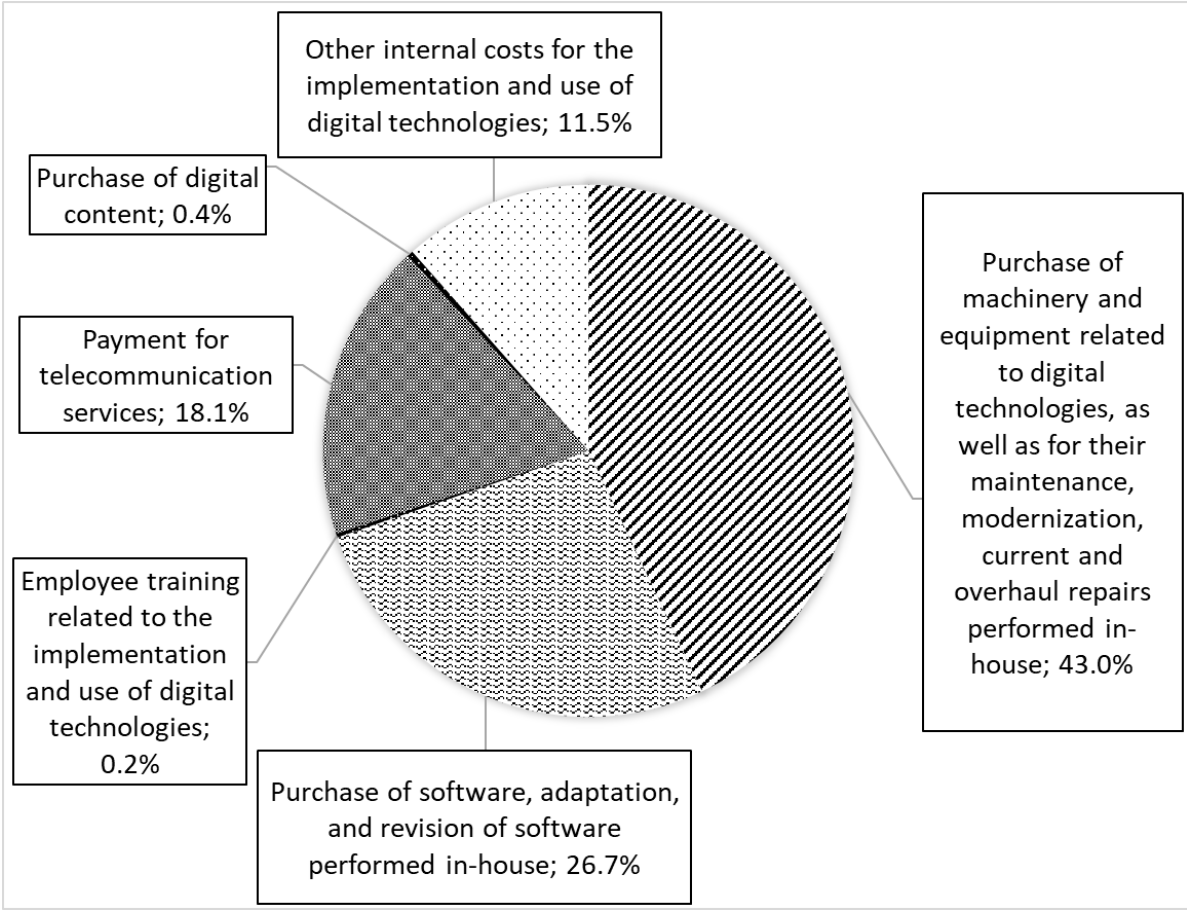

Figure 3. Structure of internal costs for ICT in the Russian Federation in 2019

Sourse: compiled by the authors according to the data from EMISS (2020)

The largest share in the structure of internal expenditures on ICT (43%) belongs to the purchase of machinery and equipment related to information technologies, as well as their maintenance, modernization, current and overhaul repairs performed in-house. This section combines both capital investments in ICT development and operating costs for maintenance and services. The situation is similar to the indicator "Purchase of software, adaptation, and revision of software performed in-house", which, in addition to capital expenditures, may include operating expenses of companies related to software.

Thus, to assess the share of capital investments in the structure of internal costs for ICT, we will use Rosstat data for 2018 (Figure 4).

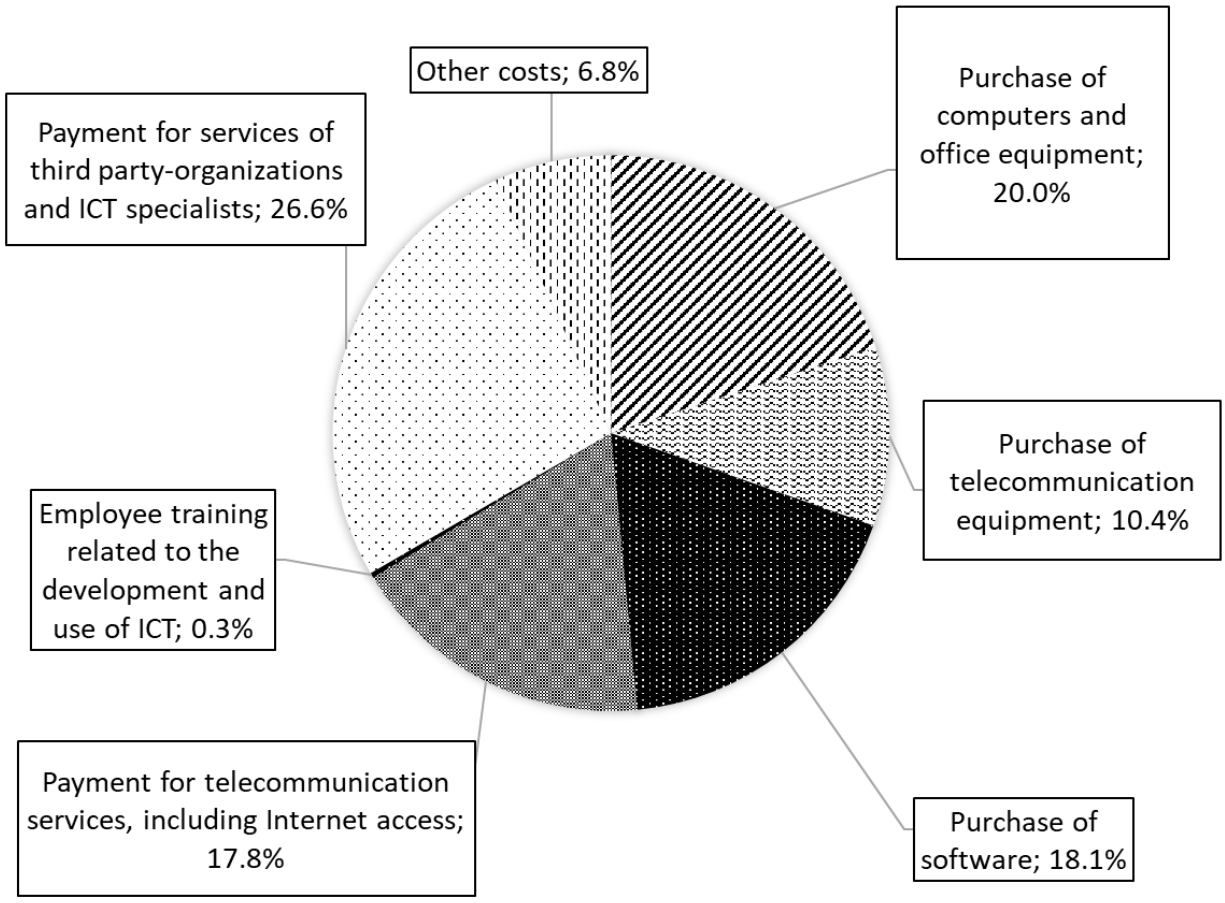

Figure 4. Structure of internal costs for ICT in the Russian Federation in 2018

Sourse: compiled by the authors according to the data from EMISS (2020)

It can be seen from this structural graph that the previously used methodology allows for a clearer division of internal costs for ICT into capital and current. Indicators “Purchase of computers and office equipment” (20%), “Purchase of telecommunication equipment” (10.4%), “Purchase of software” (18.1%), and “Employee training related to the development and use of ICT” (0,3%) characterize mainly capital investments (in the amount of 48.8%). The rest of the indicators “Payment for telecommunication services, including Internet access” (17.8%), “Payment for services of third-party organizations and ICT specialists” (26.6%), and “Other costs” (6.8%) mainly combine operating (current) costs (in the amount of 51.2%).

A similar indicator "The share of capital investments in the structure of costs for ICT" in previous periods was: 2016 - 54.5%, 2017 - 50.3% and, as can be seen from Figure 4, in 2018 - 48.8%. These data confirm the tendency of saturation of the resource base of regional economic systems with long-term assets related to ICT. Operating costs for the maintenance and servicing of the created information infrastructure are growing. Thus, when constructing resource models of the impact of investments in intellectual capital on labor productivity and economic growth, we will focus on the indicator "Costs of ICT in the reporting year", taking into account the analysis of their structure in the Russian Federation in 2018.

The indicators "Investment in fixed assets in the education sector" and "Capital expenditures on R&D" are present in statistical reporting and are part of the total volume of investments in fixed assets, which must be taken into account in modeling. As a basis for modeling the relationship between labor productivity and factors characterizing budget investments, we use the Cobb-Douglas production function, which has proven itself in economic research and is suitable based on the economic content of the phenomenon under study. We represent the function of labor productivity in the regions of the Russian Federation as follows:

$$LP = \alpha_1 \times K\_priv^{\alpha_2} \times K\_fed^{\alpha_3} \times K\_reg^{\alpha_4} \times ICT^{\alpha_5} \times RD^{\alpha_6} \times E^{\alpha_7}, \quad (1)$$

LP - labor productivity in the region (gross regional product per person employed in the regional economy), thousand rubles per person;

K_priv - specific private investments in fixed assets (investments in fixed assets, excluding budget investments in fixed assets), thousand rubles per person;

K_fed - specific budget investments in fixed assets, excluding capital expenditures on ICT, R&D, investments in fixed assets of the education sector (from the federal budget), thousand rubles per person;

K_reg - specific budget investments in fixed assets, excluding capital expenditures on ICT, R&D, as well as investments in fixed assets of the education sector (from the regional budget, as well as from municipal budgets), thousand rubles per person;

ICT - specific capital expenditures for ICT, thousand rubles per person;

RD - specific capital expenditures for R&D, thousand rubles per person;

E - specific investments in the fixed assets of the education sector, thousand rubles per person.

This choice of indicators is primarily due to the idea of testing the significance of factors for building up intellectual capital against the background of traditional investments in fixed assets, which ensure an increase in the capital-labor ratio. Initially, it was clear that the dynamics of investments in fixed assets will have the greatest impact on changes in labor productivity. It was required to assess the impact of three other factors: investments in fixed assets in the education sector, investments in the creation of ICT, and investments in R&D.

Regression analysis was used to study the relationship between labor productivity and capital expenditures, including the development of intellectual capital in the regions. The following hypothesis was to be tested:

H_0: Budget investments in the intellectual capital of the region increase labor productivity.

2. DATA AND RESULTS

The study includes data on 85 constituent entities of the Russian Federation for 2017–2019. The choice of this time interval for the analysis is due to the fact that some of the indicators included in the study have been collected by the Federal Statistics Service of the Russian Federation since 2017. The sources were the official statistics data presented on the websites of the Federal State Statistics Service (https://rosstat.gov.ru/) and EMISS (https://www. fedstat.ru/).

Descriptive statistics are presented in Table 1.

Table 1. Descriptive statistics

	Mean	*Median*	*Maximum*	*Minimum*	*Std. Dev.*	*Observations*
LP, thousand rubles / person	1210.751	882.9332	10574.37	339.1694	1271.783	255
E, thousand rubles / person	4.752074	3.507406	30.31744	0.535499	4.334435	255
ICT, thousand rubles / person	5.669033	3.735212	81.92207	0.416619	7.204527	255
K_fed, thousand rubles / person	17.92476	10.06021	151.4275	1.033966	22.54198	255
K_priv, thousand rubles / person	197.3155	91.51418	4171.246	3.992094	435.6644	255
K_reg, thousand rubles / person	11.5702	7.592009	175.5559	2.015862	15.44417	254
RD, thousand rubles / person	0.162374	0.051614	4.190647	0	0.35938	242

Source: authors' calculations

Taking the logarithm of equation (1), we obtain the following dependence:

$$\ln LP = \ln \alpha_1 + \alpha_2 \ln K_{priv} + \alpha_3 \ln K_{fed} + \alpha_4 \ln K_{reg} + \alpha_5 \ln ICT + \\ + \alpha_6 \ln RD + \alpha_7 \ln E.$$

Since the raw data for analysis has a panel data structure, panel regression models with fixed or random effects apply to them. All variables were tested using the Levin, Lin, and Chu unit root test for panel data. The studied variables are stationary at a statistical significance level of 5%. The resulting models are panel regression models with random effects. The random effects models are appropriate according to the Hausman test. Estimated econometric models are presented in Table 2.

Table 2. Econometric models

Variable / Model	*Model 1*	*Model 2*
Dependent variable	$\ln LP$	$\ln LP$
$\ln K_{priv}$	**0.261323*** **	**0.270753*** **
	(0.022411)	(0.021343)
$\ln K_{fed}$	**-0.036839** **	**-0.026319** *
	(0.015660)	(0.013669)
$\ln K_{reg}$	**0.041908** **	**0.067498*** **
	(0.020476)	(0.019633)
$\ln ICT$	**0.104261*** **	**0.093217*** **
	(0.024666)	(0.024316)
$\ln RD$	0.003282	
	(0.007432)	
$\ln E$	**0.069814*** **	**0.060749*** **
	(0.015107)	(0.014254)
Constant	**5.442010*** **	**5.059230*** **
	(0.100551)	(0.094321)
R-squared	0.532616	0.539489
Adjusted R-squared	0.520580	0.530205
F-statistic	44.25326	58.10648
Observations	240	254
Note: Standard Errors are in parentheses. *** stat. significance on 1%, ** stat. significance on 5%, * stat. significance on 10%.		

Source: authors' calculations

The analysis of the model (1) showed a statistically significant effect of all factor variables, except for the factor "specific capital expenditures for R&D". Accordingly, the hypothesis that this factor has a significant impact on labor productivity has not been confirmed. Indeed, in Russian practice, a very insignificant part of scientific and technical developments is introduced at enterprises in the short term. Even fewer innovations find their application within the same regional system. Most often, a business is looking for new solutions for commercialization not only in their region but throughout the country, as well as abroad. It turns out that investments in the development of intellectual capital through support for R&D should be more the prerogative of the federal center than regional socio-economic systems.

Then a second model was built without this factor, in which all variables turned out to be significant. The resulting model looks like:

$$LP = 157.47 \times K\_priv^{0.27} \times K\_fed^{-0.03} \times K\_reg^{0.07} \times ICT^{0.09} \times E^{0.06}.$$

3. DISCUSSION

Based on the simulation results, analyzing the indicators of labor productivity elasticity by directions and sources of financing of fixed capital, the following conclusions can be drawn.

The private investments in fixed assets elasticity of labor productivity is 0.27, that is, with an increase in private investment in fixed assets by 1%, labor productivity will increase by 0.27%. The total budget investments in fixed assets elasticity of labor productivity is 0.20, which is close to the private investments in fixed assets elasticity of labor productivity. In the structure of the budget investments in fixed assets elasticity of labor productivity, the largest share is made up of capital expenditures on ICT (0.09). Next in importance are regional investments in fixed assets (0.08) and investments in fixed assets in the education sector (0.06).

The ratio of the weighting factors in the constructed econometric model showed that the allocation of regional resources for the digital transformation of the economy gives, on average, a higher positive effect on the dynamics of labor productivity than investments in education.

CONCLUSION

The study results proved that purposeful and targeted budget investments in the intellectual capital of the region can partially neutralize negative trends in the economy and contribute to an increase in labor productivity.

If we eliminate the direct impact of investments in fixed assets aimed at increasing the capital-labor ratio, the investments in the digital transformation of the economy and the digitalization of labor and related processes have the greatest impact on the labor productivity growth. Investments in the education system showed one and a half times less impact on labor productivity, which is not surprising. Firstly, the effect of changes in the educational environment has a long time lag. And secondly, the digitalization process currently covers the educational process. Thus, both of these factors can be considered in combination.

In conditions of economic instability, budget investments play an increasingly significant role in maintaining the labor market and increasing the efficiency of labor resources use. In close cooperation with the federal center, specific budgetary proportions and planning tools for Russian regions are currently at the stage of development and require further research.

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