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**CONTROL IN THE HUMAN CAPITAL MANAGEMENT SYSTEM IN THE STRATEGY OF
INNOVATIVE DEVELOPMENT OF A REGION**

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Abstract. This research paper examines the control function and its importance in the processes of formation and development of human capital to ensure the innovative development of a region using the example of the Republic of Tatarstan. The authors have examined the main control mechanisms in the field of human capital training, as well as in the high-tech and innovative sectors of the economy of the Republic of Tatarstan, and they offer their own recommendations for its improvement. To conduct the study, statistical methods were used to collect and analyze data in order to identify the weaknesses and strengths in the system of monitoring the development of human capital. Based on the study, a model of innovative development of the Republic of Tatarstan, supplemented with control elements, was proposed in terms of providing it with human capital. The practical significance of the results obtained is to supplement the theoretical provisions of the control function in the system of state and regional management in the interests of innovative development.

Keywords: human capital management system; human capital of a region; control function; innovative development of a region; the Republic of Tatarstan; innovation development strategy; cluster approach; intellectual and innovative potential of a region

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1. Introduction

Today, the Russian economy is affected by a huge number of global challenges of an internal and external nature related to the decline in industrial production, the growth of social inequality and the deterioration of the general social and economic situation in its regions (Nagimov et al., 2018). In the context of intensified globalisation processes and scientific and technological progress, the Russian economy in order to increase its competitive position in the world market must be primarily high-tech and innovative (Korableva et al., 2018; Mironov et al., 2018a). The matter is that currently in the developed countries of the world the growth of gross regional product thanks to innovative goods and services reaches 85% of the total gross regional product. This is due to the fact that about 90% of the entire intellectual and innovative potential of the world is concentrated in these countries, with over 80% of the high technology market being under their control. Revenue from this market exceeds \$ 2.9 trillion per year and continues to grow, which is well above the extractive and energy sectors (Mironov et al., 2018a). Innovative technologies, as a rule, require a significant amount of investment, including in human capital, both at the state level and at the private entrepreneurial level (Danchikov et al., 2018; Plotnikov et al., 2019; Orynassarova et al., 2019).

The effective innovative activity of a region largely depends on the proper use of human capital, since institutional development in any economic system is carried out under state control (Lebedeva et al., 2016; Kondrashova et al., 2015). At present, control as a management function is recognized as the determining component of the process in achieving high quality work not only of enterprises, but also of regional systems. Control is an information system, including the collection, processing, storage and transmission of management information (Gurieva et al., 2016). There is generally accepted logic: no control, no exact implementation of the plan, no high result of the enterprise. This statement is also true for a regional economic system (Mironov et al., 2018b; Korableva et al., 2019). Control, as an institution of economic security, allows us to evaluate the fulfillment of the tasks set, the achievement of the stated indicators and is effective only with correctly selected targets that the economic entity seeks to achieve (Akhmetshin & Vasilev, 2016; Rahim et al., 2017; Korableva et al., 2019). Human capital, like any other component of socio-economic development, requires clear timely monitoring. The main indicators of human capital in the framework of the innovative development of a region include both the indicators shaping it (the availability of higher education, the costs of educational and scientific activities), and the indicators characterizing its effectiveness - the share of innovative goods and services in the total volume of GRP, etc. The main task of managing human capital is the creation of favourable conditions, including motivation and retention of the labour potential of a region and the formation of an innovative type of thinking in all sectors of economics (Latyshev, 2015; Ibatova et al., 2018; Girdzijauskaitė et al., 2019; Prodani et al., 2019; Orynassarova et al., 2019; Bernardi, 2019).

Thus, the key element in the management of human capital to ensure innovation is control, which should be directly related to the general strategic concept of the region development (Brager et al., 2018).

2. Methodology

This scientific work was formed based on the following stages of scientific research:

1. The first stage consisted in studying theoretical provisions on control as a management function and showing its relationship with the human capital management system in the interests of the innovative development of regional economic systems.
2. The second stage was dedicated to analysing the economic development of the Republic of Tatarstan and studying the system of management and development of human capital. The innovation system of the region was studied in more detail and the mechanisms for monitoring these systems were examined. The study identified the

main problems associated with the formation of human capital in the interests of the innovative development of regional economic systems that had arisen due to the insufficient level of implementation of the control function.

3. The third stage presents the author’s recommendations for improving the system of human capital formation in the strategy of innovative development.

The theoretical basis of the study was formed by the results of fundamental scientific works of leading domestic and foreign scientists whose research was devoted to the control functions in management, to human capital and human resource management, as well as studies on the relationship of human capital and innovative development (Vorobeva et al., 2016; Singareddy et al., 2019; Trofimova et al., 2019; Voronkova et al., 2019).

The methodological basis of the study is the dialectical method, a systematic approach to the analysis of the facts and phenomena under consideration. The study is based on the wide use of methods of analysis and synthesis, systematisation and complexity, comparative analysis, factor analysis, as well as methods of structural-functional, statistical analysis. The above methods were used in various combinations at different stages of the study, depending on the goals and tasks to be solved, which undoubtedly contributed to ensuring the reliability of the analysis and the validity of the conclusions made by the authors (Osadchy, 2015)

The empirical base used was the database of the Federal Service for Regional Statistics of the Republic of Tatarstan, the results of statistical and sociological studies, legal acts of the Republic of Tatarstan (Innovation Memorandum, Law on Innovation Activities, the Strategy for the Development of Human Capital until 2030), as well as materials from scientific seminars and scientific and practical conferences.

3. Data, analysis, and results

3.1. Problems of innovative development of the Republic of Tatarstan

The subject of the Russian Federation, the Republic of Tatarstan, was taken as the object under study in this work. The choice of this region is due to the fact that the Republic of Tatarstan is traditionally considered to be the oil-producing region of Russia, that is, depending on the raw material sector of the economy, which is inherent in many regions of the Russian Federation. For this very reason, the development of the innovation sector in the Republic of Tatarstan through the formation of competitive human capital is of great importance, since most of the region’s tax revenues come from income tax from the oil and gas sector (Table 1), (Fig. 1).

Table 1: The structure of tax and non-tax revenues of the budget of the Republic of Tatarstan in the years 2014 to 2018, percentage

Revenue Type	Yearly Values				
	2014	2015	2016	2017	2018
Income tax	47%	41%	39%	37%	40%
Personal income tax	23%	26%	25%	30%	27%
Property tax	13%	16%	12%	14%	13%
Excise taxes	12%	14%	13%	13%	12%
Total Income Taxes	2%	2%	2%	3%	3%
Other tax revenues	2%	2%	3%	1%	3%
Non-tax revenues	2%	1%	6%	2%	2%

When considering the structure of income tax (Figure 1), it becomes obvious that almost half of this tax is formed by oil companies.

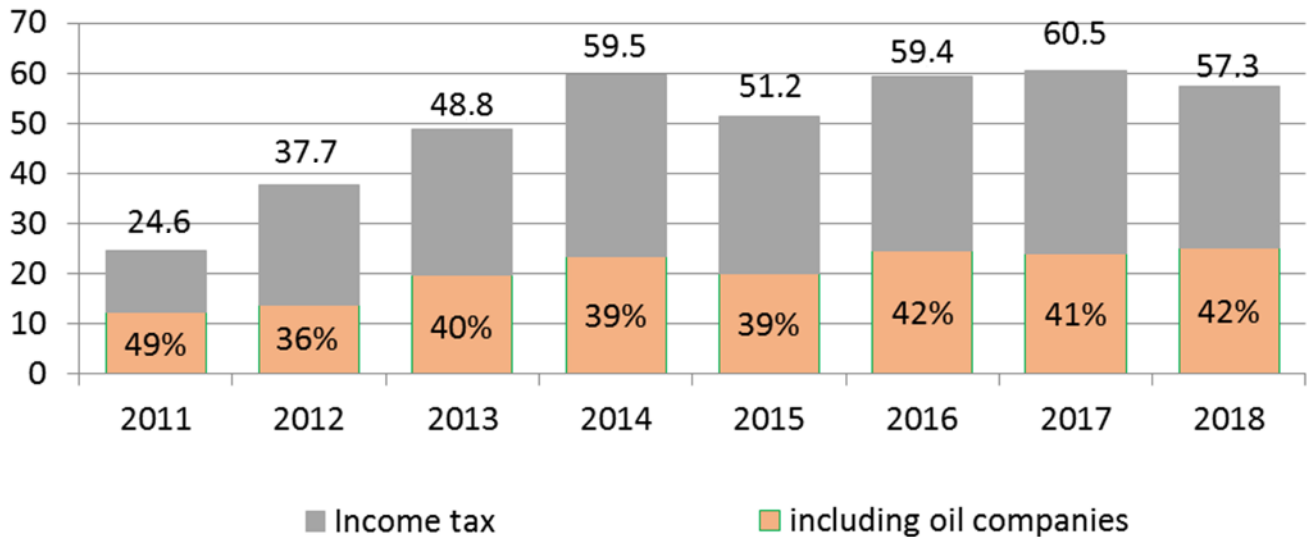


Fig.1. The volume of income tax to the budget of the Republic of Tatarstan, billion rubles

In the future, this dependence on the oil sector is going to bear not only economic risks, due to the declining cost of oil on the world market, but also those of environmental safety. Therefore, it is necessary to develop the sector of high-tech, knowledge-intensive and innovative products. As we have noted earlier, in developed countries, gross domestic product growth of more than 70% falls on innovative products and science-intensive products, which means that it is necessary to invest as much as possible in the development and formation of intellectual and innovative potential (Akhmetshin, 2017).

However, this is possible only with a high level of human capital in the field of scientific and innovative activity. Human capital combines the competencies and skills of people. Their relationship becomes the basic component of intellectual capital; intellectual capital, in turn, together with financial capital make up the common value of companies and regional systems (Gabaidullina et al., 2018). Therefore, it is so important to coordinate the actions of regional mechanisms in the field of human capital formation.

3.2. The human capital management system of the Republic of Tatarstan in the field of innovation

For this reason, since 2012, more and more attention has been paid in the Republic of Tatarstan to innovations and human capital showing high potential. Consider human capital and its indicators characterizing the premises of its development and use in the field of innovation (Table 2).

Table 2. Innovative and intellectual potential of human capital of the Republic of Tatarstan

Parameter Name	Yearly Values					
	2013	2014	2015	2016	2017	2018
1. Intellectual and Innovative Potential						
Coverage of the population with higher education programs,%	30.3	29.9	29.2	27.5	26.5	26.4
Of these, due to the budget allocation,%	42	45	46	49	51	52
Average cost of higher education for 1 semester, rubles	31973	34500	39502	43751	48159	53350
Proportion of economically active population with higher education (among population groups of 25 to 64 years old),%	31.5	32.7	33.1	34.5	35.1	36.3
Number of graduate students and doctoral students per 100 thousand people	110.5	113.7	115.2	112.5	114.2	115.3
Number of personnel engaged in research and development, per 10 thousand people. employed in the economy	72.8	75.4	72	36.3	37.6	37.8
Number of articles published in peer-reviewed journals indexed at the	27.2	22.8	20.3	16.9	10.5	4.3

Russian Science Citation Index, per 100 researchers.						
Number of patent applications for inventions filed with Rospatent by national applicants, in relation to the number of economically active population, per 10 thousand population	551	668	550	602	564	592
2. Investment in Science and Innovation						
Share of domestic research and development costs in gross regional product, percent	0.75	0.9	1.05	1.4	1.77	2.0
Proportion of the cost of research and development, financed from own funds of organizations, percent	30.0	33.0	35.0	36.0	38.0	40.0
Public spending on education, as a percentage of gross regional product	22.4	23.1	21.3	19.1	17.2	21.0
Shares of investments in education, to the total volume of investments in fixed assets to GRP	1.4	2.3	2.3	1.7	2.6	1.2
3. Intellectual and Innovation Performance						
Share of innovative products in gross regional product, percent	15.6	14.9	18.4	21.1	20.5	20.4
Share of high-tech and knowledge-intensive industries in GRP, %	18.4	19.9	20.6	19.3	20.5	18.8

According to the above Table 2, the Republic of Tatarstan has a huge reserve of human capital, especially in the field of innovation. However, in recent years there has been a noticeable decrease in innovation processes, since there has been an almost twofold reduction in the number of scientists, with no change in the number of doctoral school graduates. In addition, the level of accessibility of higher education is declining more and more due to a significant increase in the prices of higher education programs (Tarman, 2016; Tarman and Chigisheva, 2017). There is a drop in inventive activity of the population. At present, the accumulated human capital allows maintaining a high level of innovative activity in the region, however, continuing negative trends may cause a number of problems in the future, which indicates an insufficient degree of control over the processes of human capital formation and development in the interests of innovative progress.

Consider the management system of human capital. As it is, the human capital management system of the Republic of Tatarstan is a set of interconnected systems, programs and management methods involved in the development, formation and use of human capital at the federal, regional and municipal levels. The parts of the human capital management system in the Republic of Tatarstan considered as the most important are as follows (Figure 2):

- Ministry of Education and Science;
- Ministry of Labour, Employment and Social Protection;
- Ministry of Youth and Sports;
- Ministry of Culture;
- Ministry of Economics;
- Ministry of Health.

These ministries, within their competences, participate in the formation, accumulation and use of human capital of the Republic of Tatarstan. In addition to ministries, there are many commissions and councils. One of them is the Interdepartmental Commission for the implementation of the state personnel policy in the sectors of the economy of the Republic of Tatarstan. The next body is the Government Commission of the Republic of Tatarstan on science, technology and innovation policy. It is also worth noting that in 2014 the Council on Personnel Policy under the President of the Republic of Tatarstan was created in order to effectively use the personnel potential, promote the development of the system of state civil and municipal service in the Republic of Tatarstan, and implement a comprehensive personnel policy. In order to develop human capital as a driving force of the economy, a strategy for the development of human capital was launched in the Republic of Tatarstan in 2014 - the

Republic of Tatarstan Strategy 2030. In this strategy, a special role is given to the development of the institutional grounds for the formation and development of competitive human capital (Fig. 2).

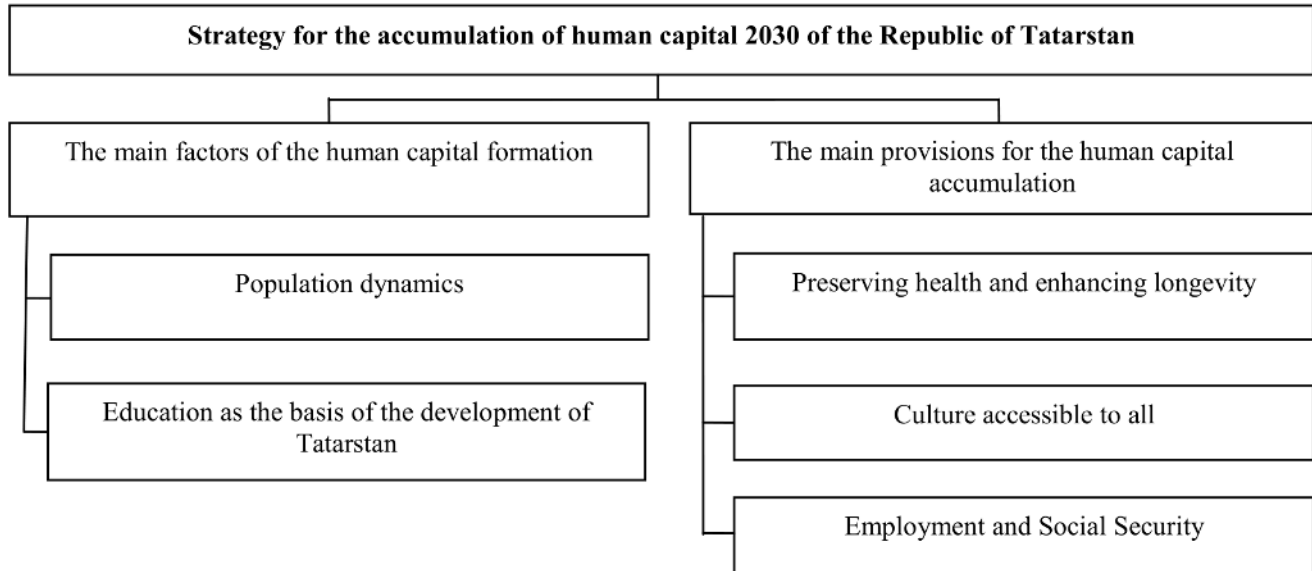


Fig. 2. Human Capital Development Program of the Republic of Tatarstan

Thus, the formation of the unified strategy of the Republic of Tatarstan 2030 is an attempt to combine innovations and the human capital management system. However, due to poor preparation and problems in the regional economic system, this program is not being fully implemented and the program phasing regulations are not followed.

Regarding the innovation system of the Republic of Tatarstan, the innovative potential of the region is determined by the presence of a number of premises for the formation and implementation of innovative activities, namely the existence of a developed intellectual and innovative infrastructure in the form of research and development institutions, appropriately trained personnel, and a developed personnel training system capable of active interaction with industrial and other sectors of the economy (Vasilev et al., 2017; Erokhina, 2013). Today, the Republic of Tatarstan has created almost all types of infrastructure for economic and scientific activities: a special economic zone, a technopolis, industrial parks, science parks, business incubator zones, Innopolis. Residents of the above subjects of innovation infrastructure are mainly representatives of foreign small and medium enterprises (Krotkova, 2016). In addition, clustering is particularly well developed. The experience of applying the cluster approach in Western countries shows that, clustering as an economic model is more effectively applicable in the issues of innovative interaction of regional economic systems (Kolpak et al., 2017; Chernetsov, 2015). In addition, economic clusters act as an important tool in modern state innovation policy (Tsertseil, 2017; Nahm, 2011; Mazur et al., 2017; Neizvestnaya et al., 2018; Kolmakov et al., 2019). They were conceived as tools that could combine many areas of economic activity that are separate elements of the region’s innovation system (science, business, education, etc.) and ensure their structural updating (Barmuta et al., 2017). These structures were created as part of the innovative strategy of the Republic of Tatarstan, the provisions of which, in the form of an organizational structure, are also taken into account in Strategy 2030.

In the framework of the 2030 program of the Republic of Tatarstan, the following innovative structure of the region is planned (Fig. 3).

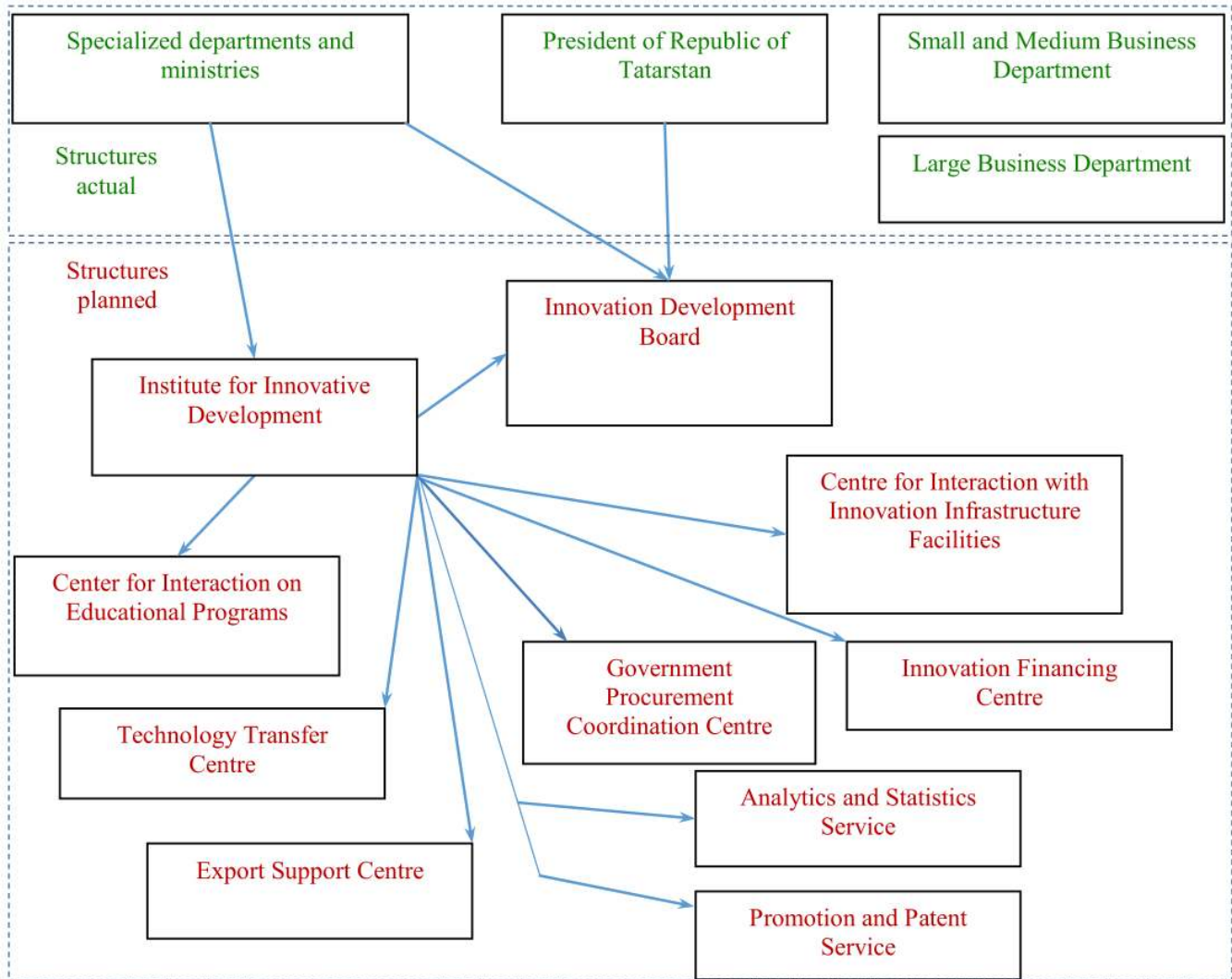


Fig.3. Structures of the system of innovative development of the Republic of Tatarstan

* already created structures are marked in green, planned ones in red.

In this innovative structure, according to the authors, number of units are absent that are important in the framework of innovative development, and there are no units that would be responsible for monitoring the implementation of development targets. Also, there is almost no system of reporting and accountability, and that of control of some structures.

3.3. Proposed Measures to Implement the Control Function in the Human Capital Management System in the Strategy of Innovative Development of the Republic of Tatarstan

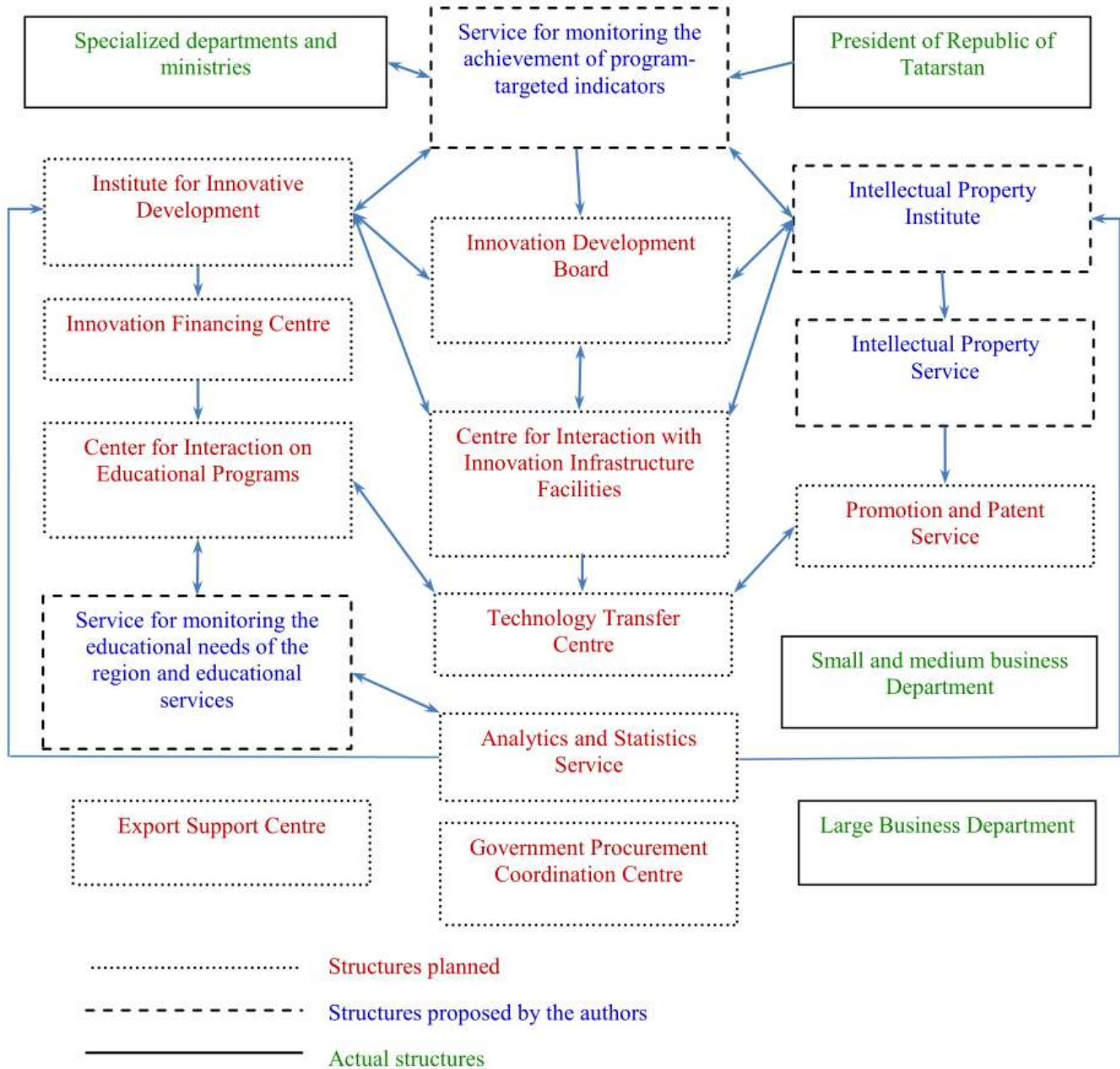


Fig.4. The proposed augmented scheme of the innovative structure of the Republic of Tatarstan

* already existing structures are marked in green, planned ones - in red, those proposed by the authors - in blue.

Within the framework of the structure offered, it is proposed to introduce several monitoring services, namely:

- 1) A service for monitoring the achievement of program-targeted indicators, which is to monitor the overall effectiveness of the human capital development strategy in general, and within the framework of innovative development. This service should identify the reasons for not achieving the goals and objectives set, as well as present for public review the annual results of the effectiveness of innovation in all programs.
- 2) Creation of the Intellectual Property Institute. This will significantly increase the inventive activity of citizens, as the intellectual property market will be formed, and the process of patenting the results of intellectual activity, their publication, application and protection will be supported by the intellectual property service.
- 3) Service for monitoring the educational needs of the region and educational services. This service will be responsible for the annual adjustment of the region's needs for highly qualified human capital, it will also monitor and regulate the price level for educational services of regional institutions, in line with the current socio-economic situation.

4. Discussion

Based on the data obtained during the study, we can draw the following conclusions:

- 1) In the future, the economic growth of developed countries will be ensured by scientific and technological progress and the intellectualisation of the main components of the means of production in all areas of the economy. Russia should enter the new stage of development and be among the leading countries in scientific, technical and innovative development (Rahman and Bobkova, 2017; Yemelyanov et al., 2019). To ensure sustainable economic growth in the country in the long run, it is necessary to make the transition to an innovative type of development and to get rid of raw material dependence. This scenario is only possible with efficient mechanisms for the human capital formation and development in innovative sectors of the economy not only in regions, but also in the private sector as a whole. The effectiveness of the innovation management system in this case is largely determined by the control subsystem that meets the adequate, timely goals and objectives of the regional development management (Vasilev et al., 2017).
- 2) One of the main values of the socio-economic development of the regions is control over the volume of investments in human capital in the interests of innovative development (Qu et al., 2017). The choice of an investment object cannot be spontaneous and must be justified, since choice is a complex process of careful selection, evaluation and analysis of various options. Then comes the final choice of the object (Artemova et al., 2017).
- 3) Control over fulfilment of objectives is meant to assess the need to change the strategy based on the results of the intermediate stages of the implementation of strategies. Tasks to be monitored usually fall into one of two types: regional results achieved in the intermediate stages of the overall long-term strategy, and strategic project results (Gabidinova, 2016).
- 4) Quantitative and qualitative indicators traditionally used in management, methods of ignoring non-financial indicators, such as product quality and customer satisfaction, staff quality and training, product innovation, flexibility and adaptability of production and management systems and technologies, lead to optimisation of the company's activities in the short term. However, in parallel, this leads to a contradiction of the results of managerial control to the development strategy of the company, the disregard of the influence of the external

environment and the activities of competitors, which is also natural for regional economic systems (Mullakhmetov & Sadriev, 2018; Schäfer, 2001; Vasilev et al., 2018).

5) The current human capital management system in the interests of the innovative development of the Republic of Tatarstan has a number of shortcomings related to the organisational structure, in particular, the lack of control groups in various fields responsible for both the formation of human capital and the development of mechanisms for activating labour in the field of innovative activity (Abilova, 2010; Dudin, 2017). The program for the human capital development of the Republic of Tatarstan 2030, does not give a comprehensive picture of the target indicators for the development of human capital and a number of other, no less important indicators, including the linking of performers and accountability in the executing structures. The introduction of mechanisms to control pricing in personnel training and intellectual property services on the part of the regional system will significantly improve the accessibility of higher education, and therefore indirectly affect the growth of innovative and inventive activity.

Conclusion

In conclusion, it is worth noting that in the context of the region's innovative development, the human factor, namely human capital, becomes the main driving force behind innovation processes and activities. It is this indicator that determines the effectiveness and formation of socio-economic programs for the development of regions and the activities of authorities using powerful institutional control systems (Morozov et al., 2018; Stoyanovskaya, 2014).

The study has shown that when organizing the management of regional systems, it is the control function that is one of the most important elements of management not only in the private sector, but also in the public sector, as it is responsible for achieving the goals and objectives set for the region (Mullakhmetov & Nazmiev, 2015). This is especially relevant and important in the field of human capital management in the strategy of innovative development, which requires a high level of development and rapid adaptation to constantly changing modern conditions.

It was found that the Republic of Tatarstan has a strong human potential in the field of innovation, developing under the Strategy of the Republic of Tatarstan 2030, however, in this system there are not enough control bodies and a number of other structures, which is going to negate in some time all the results achieved, as the accessibility of higher education of the population tends to significantly decrease, the inventive activity of the region is becoming less intensive due to the lack of an intellectual property institution, and a number of other reasons. In view of this, we propose our own innovative structure of human capital development, with additional control elements.

The proposed organisational control structures in the innovation system of the Republic of Tatarstan can help in the human capital formation to ensure the strategy of innovative development and create favourable conditions for pursuing innovative and investment economic policies of the region.

Thus, it is necessary to continue the active development and modernization of the existing programs for the human capital development. Tatarstan needs emphasis on the preparation of innovative programs for territorial clusters, priority development areas and special economic zones, the creation and development of which is laid down in the strategic development program of Tatarstan until 2030, using the main factor - human capital. It is necessary to develop strategic programs for the development and support of domestic business in the framework of import substitution, attracting local small and medium-sized businesses, providing them with financial and informational support. The development of joint activities of regional universities and national companies will

increase the quantity and quality of high-tech products that can meet current and future global challenges. However, all this is only possible with a balance of regional human resource needs and their potential values in various sectors of the economy (Abilova, 2010). Therefore, this topic requires further in-depth research and individual studies, especially in the staff training system, human capital management and its control system.

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