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**HUMAN CAPITAL AS A FACTOR IN THE IMPLEMENTATION  
OF THE GOELRO PROGRAM**

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**Abstract**

The article examines the problem of applying human capital as creative economic resource in historical retrospect on the example of implementing the innovative strategic program of GOELRO. The Commission consisted mainly of specialists from the pre-revolutionary school of engineering, but it had to realize a long-term plan for the development of the national economy in the state of the socialist formation. The research is based on the theory of human capital, which presupposes the search for labor reserves based on the educational, practical, and creative capabilities of a person as a subject of industrial activity. The leading principles of engineering personnel training in bourgeois Russia are revealed. Engineering education in pre-revolutionary Russia was aimed at producing a universal specialist who was able to set up not only technical work based on scientific achievements, but also to organize the entire production process, competently manage it, making managerial decisions. The article analyzes the reasons and factors that contributed to the cooperation of bourgeois specialists and scientists with the Soviet government, which promoted the ideology of Marxism-Leninism, which was often incompatible with the ideological position of the attracted cadres. The Soviet state was able to correctly build a personnel policy, to use the human capital of the bourgeois formation in the implementation of strategic tasks of the socialist economy. The significance and role of engineers in the process of developing and implementing the GOELRO plan were determined, the strategic directions of the plan were determined, and scientific, creative, and technical ideas were implemented.

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## 1. Introduction

The first example of strategic economic planning in the history of Soviet industrialization was the GOELRO plan, developed by a team of more than 240 leading scientists and engineers in all fields of science and technology. The plan can rightly be considered a strategy of technical and economic development based on the principle of harmonious development of all sectors of the national economy (Tagirova et al., 2020). This strategy took into account the potential of the national economy, its reserves of natural, capital, labor, and intellectual resources. It should be taken into account that the implementation of such an ambitious, large-scale project took place in extreme conditions, when the foundations of economic management were actually destroyed, and the country was plunged not only into a state of socio-economic, but also spiritual and ideological crisis. The scientists who developed the plan planned a system of measures to restore the destroyed economy. The rapid development of the electric power industry was the main activity of the plan aimed at accelerating economic growth and improving the quality of life of workers (Chubais, 2018). The preparation and implementation of strategic planning became possible largely due to the use of human capital, which was formed in the bourgeois era, but had a powerful potential, which had no analogues in the young Soviet state.

## 2. Problem Statement

The problem of human capital was first investigated by the Nobel prize-winning economist Schultz (1981). In his opinion, human capital is acquired valuable qualities that can be enhanced by appropriate investment (Schultz, 1981). According to the theory of Schultz and his followers, there are no fundamental differences between material and human capital, since both bring income. He argued that investment in human capital has a higher priority and precedes investment in material capital. By investing in human development, society can achieve not only an increase in labor productivity, but also a more equitable distribution of goods, social benefits and services. Becker (1964), like Schultz, interpreted human capital in the most general sense: human capital is a set of innate abilities and acquired knowledge, skills and motivations, the appropriate use of which contributes to an increase in income. Human capital is generated by investment in people, including training, on-the-job training, health care costs, migration, and the search for information about prices and incomes (Becker, 1964). Human capital is the basis for building human potential. A significant difference between these concepts is that human capital is a set of available mental and physical qualities of individuals that allow them to carry out economic activities. Human potential is represented as the maximum possible amount of human capital. A similar scientific position is held by the researcher Doktorovich (2010), who believes that potential is a potential substance, and capital is an actual substance. In the modern intellectual-intensive economy, the problem under study is very relevant and requires addressing the origins of the use of human capital, formed in bourgeois conditions, in solving the economic problems of a planned economy.

## 3. Research Questions

With each passing decade, humanity discovers previously unknown horizons of knowledge, fundamentally new ideas are being born, and the processes of globalization and informatization of society

are accelerating. Modern conditions form new factors that determine the vectors of socio-economic development of society. This raises the question of what place is given to human capital in this process. By human capital, the authors mean the degree of education, possession of certain knowledge, skills and abilities, initiative and creativity, that is, everything without which, in our opinion, the further effective development of society is unthinkable. Is the role and significance of human capital changed with the transition from one type of social structure to another? Are there any historical examples of the implementation of ideas and inventions that emerged during the transitional historical period and were successfully applied in other, different conditions? We find it interesting to consider the history of development in 1920 from this point of view. the plan for electrification of Soviet Russia, since the authors of this project were bourgeois specialists, and it was created on the initiative of the Communist government, which carried out socialist innovative transformations in a crisis economy. In the first years of the Soviet Republic, bourgeois specialists were people who received education under the tsarist regime and were in no hurry to recognize the new government, but for a number of reasons took an active part in the implementation of the designated Soviet project.

#### **4. Purpose of the Study**

The purpose of the study is to identify in historical retrospect the potential use of human capital in solving socio-economic and socio-political problems, including the development of strategic directions for the development of society at a critical stage of social transformation. The subject of the study is the activities of the Russian electrification Commission. Being created in the extreme conditions of the early period of the Soviet economy in 1920, the Commission consisted mainly of specialists from the pre-revolutionary school of engineering, but it had to implement a long-term plan for the development of the national economy in a socialist state with an approved command and administrative economic system.

This goal involves solving a number of research tasks:

- identify the main principles of training engineers in pre-revolutionary Russia;
- analyze the reasons that prompted Russian scientists and engineers to cooperate with the new government, whose ideology was not close to them;
- determine the role and importance of bourgeois engineers in the development and implementation of the GOELRO strategic plan.

#### **5. Research Methods**

The research is based on the theory of human capital, which can explain a wide range of phenomena and mechanisms of economic functioning at different levels. The authors proceed from the understanding of the person as the initial link for the analysis of labor relations. "Human capital" refers to the stock of knowledge, skills, and abilities that are formed in the course of training and are present in every person-worker and can be used, including in production activities in solving socio-economic problems of the economy. Human capital is becoming an important condition for long-term economic growth and development, and it stimulates educational policy. Based on the modernization paradigm, we consider the socialist economy as a special historical type of industrial development, for which the essential characteristic of "modern economic growth" is relevant – an increase in labor productivity based on the

application of new knowledge obtained and disseminated as a result of the development of science and education. In the socialist economy, any intellectual work was considered as a kind of public service (Fursov et al., 2018).

Professional knowledge and skills begin to form within the walls of specialized educational institutions and continue to be honed throughout the entire working life of a person. Information obtained in the process of education, realized in the practice of production activities, is an essential factor of economic growth and development. Becker saw two main components in human capital. He referred to them as 2 parts, the specific one that is useful at this enterprise, specific, and the general part that is used for work at other similar enterprises, General parts. The concept of the researcher, created on the basis of studying the professional training of employees in the course of their work, in our opinion, can be applied to the study of labor resources in a socialist economy. The specific component of human capital is used to implement the plans of its owner only in the economic system in which it was acquired, the general component can be implemented in other economic systems. 240 specialists from various fields of the national economy, such as scientists, engineers, specialists in agriculture were invited to work on a strategic plan for the development of Soviet Russia in 1920, and most of them received specialized education in bourgeois Russia, in conditions significantly different from the nascent Directive economy of Soviet Russia (Sumburova & Zaelskaya, 2021). The General part of the human potential of the bourgeois specialists involved in the implementation of the GOELRO plan was considered as borrowing effective innovations that proved their advantage in the conditions of catching up with modernization. In addition, the total cost of borrowing and adapting human capital turned out to be less than the cost of own innovations.

The use of the retrospective method made it possible, based on the theory of human capital developed in the second half of the XX century, to understand and evaluate previous events related to the implementation of the GOELRO plan in the light of a higher stage of development of scientific thought. The use of the comparative-historical method contributed to the identification of the essential-content characteristics of the problem under study. The problem-chronological method is used to restore the sequence of events for the reconstruction of the studied historical reality. The use of a set of methods of scientific knowledge allowed us to achieve the goal of research in the light of the theory of human capital.

## **6. Findings**

In 1920 Soviet Russia, looking for ways out of the prolonged socio-economic crisis, began to develop a fundamentally new technical and economic strategy based on universal electrification. The members of the GOELRO Commission and the engineers and scientists involved in the collaboration represented the elite of the Russian corps of engineers. Among them were power engineers, hydraulic engineers, electricians, electrical engineers, physicists, heat engineers and representatives of other specialties. All of them were educated at Russian higher educational institutions, including the St. Petersburg Institute of railway engineers, the Imperial Moscow technical school, the St. Petersburg technological and Polytechnic institutes, as well as the physics and mathematics departments of St. Petersburg and Moscow universities. These educational institutions at the turn of the XIX – XX centuries were the centers of convergence of fundamental science and engineering practice. In the walls of these institutions, according to the researcher Saprykin, powerful laboratories were created to conduct research

in the field of mechanics, materials science, electrical engineering, and shipbuilding", which allowed in the following years to create "on the pre-revolutionary reserve Soviet research institutes and have a great influence on world science and engineering education in general (Saprykin, 2012). According to the famous Russian and American mechanical scientist Timoshenko (1878-1972), a graduate of the Saint Petersburg Institute of railway engineers in 1901, "the activity of Russian engineering schools in the nineteenth century was at a very high level, ... Russia during this period made a significant contribution to the development of engineering sciences" (Timoshenko, 1997, p.18).

Researchers of engineering education in the Russian Empire, in fact, agree on the existence of a special Russian method of training engineers, highlighting its main components (Toporkova, 2018). First, there is a high fundamental training of students. Timoshenko wrote that the engineering profession was highly regarded in Russia, and the number of young people who wanted it was several times higher than the number of vacancies (Timoshenko, 1997). Secondly, engineering training involved studying theoretical subjects at a level not inferior to the University. Third, practical training in laboratories and the relationship of the educational process with scientific research and industry were given an important place. This was the fundamental difference between the training of engineers in the Russian style and the traditional training of "masters" and "technicians", which was based only on the practice, the leader of which was England (Saprykin, 2012). As early as 1810. Betancourt (1758-1824), the founder of Russia's first higher engineering educational institution – the Saint Petersburg Institute of railway engineers-formulated the main requirement for future graduates: to supply Russia with engineers who could be assigned to the production of all works in the Empire right after leaving the institution (Yegorova, 2006). Another distinctive feature of the training of Russian engineers was that engineering universities prepared students not only for technical activities, but also for the profession of enterprise Manager. An engineer with a higher education had to be both a scientist, a technical specialist, and an organizer of industrial production (Saprykin, 2012).

Such a wide range of knowledge, skills and abilities allowed, in our opinion, representatives of the pre-revolutionary engineering school to cope with the most difficult task set for them by the Soviet government. The idea of state electrification of Russia (the GOELRO plan) was born in the difficult years of the Soviet Republic's formation and was intended, on the one hand, to lead the country out of the socio-economic crisis, and, on the other, to outline promising directions for the development of the national economy on the basis of universal electrification. 240 people – scientists, engineers, designers, and builders-were involved in the development of the plan. The leading role among them was played by engineers and scientists, representatives of Russian science and the higher school of engineering. Lenin (1870-1924) wrote in one of the articles: "We gave a state task, mobilized hundreds of specialists, and received in ten months – although not in two, as we first planned – a unified state plan, built scientifically" (Lenin, 1970, p. 343).

Naturally, the question arises, how it was possible to attract intellectual workers to participate in the development of the GOELRO plan. The popular Petrograd daily newspaper «New life», in its issue of January 12, 1918, wrote that "bourgeois specialists" were reluctant to cooperate with the Bolsheviks. The majority took a wait-and-see attitude, skeptical of the Communist ideology. But after the dissolution of the Constituent Assembly, when the hope of the bourgeois-democratic forces coming to power collapsed, some specialists began to incline to cooperate with the Bolsheviks. On February 15, 1918, the «Petrograd voice» reported: the intelligentsia is selling their belongings and almost starving, some have gone over to the side

of the Bolsheviks (Anisimov, 2014). The leading layer of the RCP (b) was wary of the old intelligentsia in connection with sabotage, but the Bolshevik leaders could not do without professionals. Historians Fortunatov and Platova (2019) believes that revolutionaries and specialists had their own ideas about what the new Russia should become, but " the Soviet party and state leadership managed to find an approach to the old intelligentsia, mobilize intellectual potential, and motivate the high creative productivity of all "detachments", social and professional groups of the intelligentsia" (p. 59).

According to researcher Gvozdetsky (2001), an important reason that prompted Russian scientists and engineers to participate in the Commission was the desire to implement their long-standing scientific developments. Russian scientist and electrical engineer Chatelen (1866-1957) wrote: "Before the great October revolution, Russian electrical engineers could be major inventors, make major discoveries, and that's all. They were not able to carry out their ideas and inventions in old Russia" (Chatelen, 1949, p. 367). The new government at least demonstrated "its interest and political will" in implementing scientific achievements (Gvozdetsky, 2001). In addition, Soviet employees were provided with rations, social benefits, housing and, if necessary, intercession before the all-powerful Emergency Commission. For example, on March 11, 1921 The Petrograd Cheka in the case of "Svir'stroy" was arrested by engineer Graftio (1869-1949). His release as a "major specialist", "not involved in the case" took place after the personal intervention of Lenin and Krzhizhanovskiy.

Along with non-party engineers, who were the majority, the GOELRO Commission included staunch Leninists, party members, or Bolshevik sympathizers. The Commission was headed by Lenin's friend and party colleague Krzhizhanovskiy (1872-1959). As students, many engineers were attracted to social democratic ideas. Among them are Klasson (1868-1926), Kirpichnikov (1881-1937), Radchenko (1874-1942), Stunkel (1882-1937).

The fate of the creators of the GOELRO plan was different. Some of them became prominent Soviet scientists and engineers, headed scientific laboratories, institutes and research institutes, received Lenin and Stalin prizes, while others suffered from the repressions of the 1930s. All of them were really smart, talented, hardworking and sincerely believed in the "electric" future of Russia - without this, the GOELRO plan could not have been implemented. This utopian project, according to some, became a reality thanks to the scientific developments of Russian scientists, the business acumen of engineers and the penetrating capabilities of party functionaries. In a word, thanks to human capital concentrated in one place and at one time and aimed at achieving a specific task.

## **7. Conclusion**

Thus, applying the theory of human capital in analyzing the results of the GOELRO innovation plan, it is possible to assert that a person with his educational, practical, and creative skills is the driving force behind the implementation of the most ambitious, strategic projects in the history of society. Engineering education in pre-revolutionary Russia was based on a special Russian method of training specialists, which was based on a high fundamental, theoretical training of students, based on a solid competitive selection of future specialists. The importance was attached to honing practical skills in laboratories, the connection of scientific training with the application of knowledge gained in industrial practice. The specifics of the Russian method consisted in developing students managerial skills, readiness to manage the entire industrial

process, and make strategic decisions. Consequently, the members of the GOELRO Commission received a fundamental education, which became the basis of their human capital, the potential of which was undoubtedly used in solving the strategic tasks set by the Soviet government. In the early period of the development of the socialist economy, the typical Soviet worker of both intellectual and physical labor had relative freedom to choose the work he performed (Zemtsov & Smelov, 2018). The reasons for the transition of bourgeois specialists to the side of the Soviet government were economic, political, ideological, scientific, and in some cases personal. The interest of the Soviet leadership in getting out of the current crisis after the revolutionary and military events with minimal costs forced them to make a competent political decision aimed at attracting bourgeois specialists to cooperate and thereby use the high-class human capital formed in the conditions of the bourgeois era in the economy. By creating conditions for the realization of the accumulated human potential, the Soviet state had an advantage over tsarist Russia, where not all scientific theories and ideas were able to be implemented. Economic factors of attracting bourgeois specialists to cooperate played an important role in Russia, which found itself in a situation of food crisis. Distribution of food rations, provision of housing and other social benefits, intercession before the all-Russian Emergency Commission became a significant help and motivation for a number of specialists when applying for service in Soviet departments. A small percentage of the members of the Commission studied sincerely sympathized with the Soviet government, were convinced ideological Marxists, and their participation in the work of the Commission was subordinated to the goal of building socialism.

By conducting a competent personnel policy, the Soviet state was able to manage the human capital of the capitalist formation far-sightedly and use its potential for the benefit of Soviet society in building the economic foundations of the socialist formation. There is no doubt that the implementation of the GOELRO plan was made possible by exclusively human resources-bourgeois specialists whose scientific, educational, industrial and creative abilities were competently used, turned utopia into reality, implementing a program of strategic importance for the state.

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## References

- Anisimov, V. D. (2014). To the question of professional adaptation of "specialists" in the conditions of formation of the Soviet power. *Approbation*, 4, 29-31.
- Becker, G. S. (1964). *Human capital. A theoretical and empirical analysis*. Columbia University Press.
- Chatelen, M. A. (1949). *Russian electrical engineers of the second half of the XIX century*. Energoizdat.
- Chubais, A. B. (2018). Russian electric power industry reform: 10 years later. *Voprosy Ekonomiki*, 8, 39-56.
- Doktorovich, A. B. (2010). Reproduction of social and human potentials. *Labour and Social Relations Journal*, 1, 11-18.
- Fortunatov, V. V., & Platova, E. E. (2019). Intellectuals in communist party composition: Fantasy and reality (1917-1940). *Intelligentsia and the World*, 1, 47-62.

- Fursov, V., Krivokora, E., & Strielkowski, W. (2018). Regional aspects of labor potential assessment in modern Russia. *Terra Economicus*, 16(4), 95-115.
- Gvozdetsky, V. L. (2001). GOELRO plan. Myths and reality. *Science and Life*, 5, 102-109.
- Lenin, V. I. (1970). *Complete works. Vol. 42*. Political literature publishing house.
- Saprykin, D. L. (2012). Engineering education in Russia: History, conception, future trends. *Higher Education in Russia*, 1, 125-137.
- Schultz, T. W. (1981). *Investing in people: The economics of population quality*. University of California Press.
- Sumburova, E. I., & Zaetskaya, S. A. (2021). GOELRO plan - An innovative program for the development of the national economy. In S.I. Ashmarina, J. Horák, J. Vrbka, & P. Šuleř (Eds.), *Economic Systems in the New Era: Stable Systems in an Unstable World. Lecture Notes in Networks and Systems*, 160 (pp. 352-357). Springer.
- Tagirova, N. F., Sumburova, E.I., & Zherdeva, Y.A. (2020). Past in the future vs. future without past: Challenges of the economic education. In S. Ashmarina, M. Vochozka, & V. Mantulenko (Eds.), *Digital Age: Chances, Challenges and Future. Lecture Notes in Networks and Systems*, 84 (pp. 3-11). Springer.
- Timoshenko, S. P. (1997). *Engineering in Russia*. PIK VINITI.
- Toporkova, O. V. (2018). Engineering education in Russia in the context of socio-historical development (18-early 20 centuries). *Vestnik of Samara State Technical University. Series: Psychological and Pedagogical Sciences*, 4(40), 151-165.
- Yegorova, O. V. (2006). Augustin Betancourt and his contribution to the organization and development of higher engineering education in Russia. *Problems of Mechanical Engineering and Automation*, 1, 125-130.
- Zemtsov, S. P., & Smelov, Y. A. (2018). Factors of regional development in Russia: Geography, human capital and regional policies. *The Journal of the New Economic Association*, 4(40), 84-108.