

**THE ROLE OF HUMAN CAPITAL IN THE FORMATION OF  
INTELLECTUAL POTENTIAL BY AGRICULTURAL ENTERPRISES**

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The competitiveness of economic sectors in general and economic entities in particular as a characteristic of the assessment of the final results of activity is currently provided by the activation of innovation processes. These processes become especially important in the current conditions of aggravation of problems of food security and import substitution in agriculture of Ukraine due to the fact that extensive methods of management in the industry are practically exhausted, and natural resources as a source of advantages and benefits are limited.

The main factors of development of the agricultural sector in such a situation should be and become innovations and investments in human capital, because it is human capital that sets the upper limit of development of the economy and society as a whole. Such problems of agricultural staffing as the outflow of labour resources from rural areas, the decline in staffing and professional qualification level of employees, the low percentage of rural school graduates returning to work after education (on average no more than 18-20%), the decline in the prestige of agricultural professions, make it necessary to search for scientifically sound recommendations and mechanisms for attracting, preserving, developing and effectively using human capital in the agricultural sector of the economy. The relevance and significance of the issues under consideration increases in connection with the need to improve the quality of products of the agro-industrial complex, and, therefore, the quality of labour in the transition to state support measures, as the activities of Ukrainian agricultural producers require support in various forms.

Thus, in modern socio-economic conditions one of the main factors of economic development is human capital. This is due to many reasons, and primarily due to the rapid pace of scientific and technological progress, the introduction of its achievements in production, as well as the emergence of new knowledge-intensive industries [1, 5].

As the economy develops, the importance of the components that make up human capital is constantly increasing. First of all, the requirements to the qualitative component: education, professional competence, as well as personal characteristics of the employee, his stress resistance and desire for continuous self-improvement are increasing. The increasing complexity and tightening of requirements of employers and society as a whole to human capital is caused by the complexity of the economic environment functioning at the macro-system level and, consequently, at the micro-environment level.

If previously it was considered that the main way to achieve competitive advantages was to strengthen the material and technical base of the enterprise, now enterprises consider human capital as the main asset, they make investments in this asset to ensure their growth and increase their competitive advantages. A person in the modern economy is seen as a valuable asset of an enterprise rather than a source of expenditure.

In the economic literature of recent years, the issues of the so-called "human capital" have become topical, which implies an increase in investment in human beings due to the costs of education and training, specialised training, as well as expenditures on health care and medical care of the population. The person is put at the centre of the reproduction process of the labour force. If we compare the economists' views on the reproduction process, when the labour force decreases due to natural ageing, as well as loss of working capacity, and which in the conditions of simple reproduction should be restored by practical retired labour force, and in the conditions of expanded reproduction - by a large amount of it, this is indeed a positive point [2, 31, 4, 8].

In the countries of Western Europe, the theory of human capital began to develop quite actively in the post-war years. The solution of social issues was intensified, and with it the growth of investments in human capital, which significantly exceeded investments in industrial capital. And, as a consequence, in these countries researchers note higher rates of labour productivity and the economy as a whole [17, p. 19].

People generate, retain and use knowledge and skills (human capital) and create intellectual capital. Their knowledge expands through interaction with other people (social capital) and generates assimilated knowledge belonging to the organisation (organisational capital) [5].

It is abilities, skills, knowledge that create value, and therefore the main bias in competent management at the enterprise should be towards attracting, retaining and developing human capital. Only employees, not their employers, own this capital and decide when, how and where they will invest it. In other words, they can choose, since work is a two-way exchange of value, not a unilateral possession of an asset by the owner.

The essence of human capital is sufficiently, in our opinion, disclosed in the definition given by the author's team [1]: "Human capital is a set of potentials, moral-psychological and physical health, accumulated and incremented as a result of investment knowledge, skills and experience necessary for professional activity in this or that sphere of social reproduction, bringing income to their owner".

We agree with the authors I.V. Zhuravlova and A.V. Kudlai, who defines human capital as a stock of abilities, knowledge, skills and motivations embodied in a person [7].

There are many approaches to the definition of the category "human capital" in the studied published literature.

Analysing the existing approaches and agreeing with many of them, we highlight several principal distinctive aspects:

- one of the features of human capital is the desire and abilities of the individual himself to continuous self-improvement through self-development and self-learning, as well as the application of investments in it in order to increase its volume;

- the reproductive process of human capital functioning (including investments in health and education, professional development, etc.) lasts practically for a lifetime. Hence, it would be more correct to use the notion of "forming" rather than "formed" (as some authors, including those mentioned above);

- innate and acquired potential and abilities of a person become human capital only when they are used in the labour process and provide a certain benefit to their owner.

Taking into account these provisions, we can give the following definition: human capital is innate and acquired in the process of life activity abilities and potential, formed by a person as a result of development (including self-development), a set of accumulated experience, skills, abilities, skills, professional and universal knowledge, abilities, motivations and health, providing income to its bearer, subject of entrepreneurship and society as a whole.

In our opinion, this definition sufficiently reveals, firstly, the general concept of the category "human capital", its essence, and, secondly, the principal possibility of its use in human activity. Human capital is a system of innate qualities, received education, way of thinking, acquired and developed opportunities of a person to work, giving the ability to produce goods, and as capital - to provide income.

Depending on the number of types of knowledge and experience that form the basis of human capital, two varieties of human capital are distinguished:

- general human capital is a combination of general theoretical knowledge, the level of moral and cultural development, a set of skills and experience, which can be used by a person in any type of economic activity and, as a consequence, at any enterprise and in its structural subdivisions at workplaces;

- professional human capital (one of the components of the general human capital) is a set of skills, knowledge and experience that relates to a specific professional activity and therefore is carried out, as a rule, at a specific workplace, in certain structural subdivisions and enterprises.

The economic literature often does not distinguish between the categories of "human capital" and "human potential". It seems to us that "human potential" is all the capabilities of a person throughout his/her life, and "human capital" is the potential of a person applied in labour activity throughout his/her life and providing him/her with income. Based on the above, we can conclude that human capital is the opportunities of human potential realised by an individual in the process of labour activity.

Such approaches to the definition of human capital are based on the emergence and development in the modern economy of new forms of relationships and interactions between the processes of production and consumption as the main forms of human life activity, which determine the special role of innovation in the development of modern society.

The subject of human capital appears in modern society as a bearer of labour and intellectual property.

It is possible to improve and, accordingly, increase the potential of human capital by improving the quality of education, increasing professionalism, improving and preserving health, cultural and moral enlightenment, expanding the information base and others.

In order to effectively manage the process of reproduction of human capital and determine the strategy of its development, it is important to first coordinate its structure, which is schematically presented in figure 1.

From the point of view of management objects, we distinguish the following levels of human capital aggregation:

- Individual human capital, the owner of which is a specific individual (employee);
- aggregate human capital, i.e. the totality of individual capitals in the context of the following levels:
  - at the level of labour collective;
  - corporate - at the level of an enterprise;
  - regional - at the level of a region;
  - national - at the level of the country.

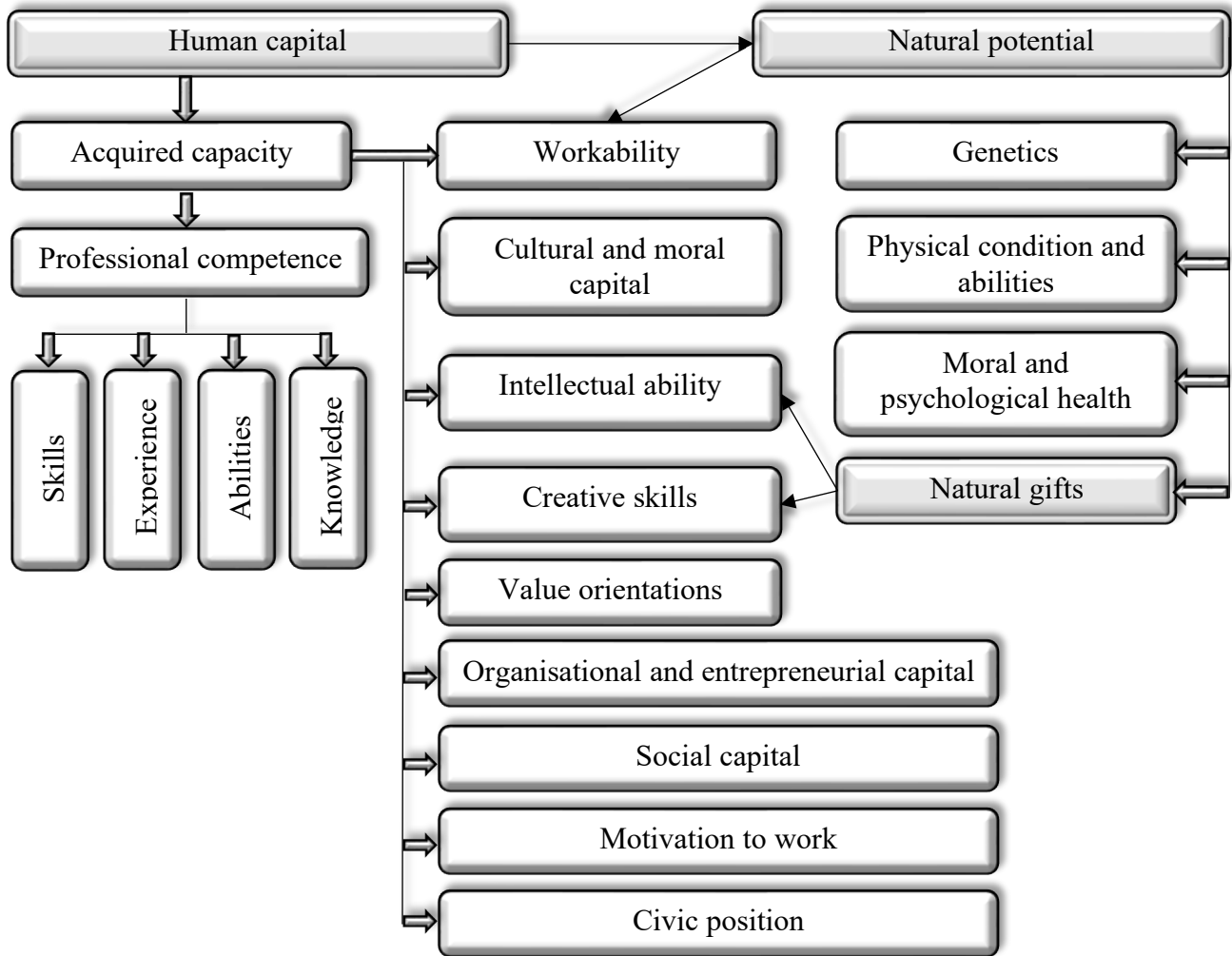


Figure 1. Structure of human capital.

Source: built by the author on the basis of [7, 11].

The individual human capital occupies the central place in this structure and predetermines all other structural components. Individual human capital is a totality of professional and personal qualities of a person relating to a particular individual, and therefore it should be given special attention in its reproduction process.

Human capital at the level of an individual enterprise is a system of individual human capitals, which has an aggregate consumer utility, a certain effect and orientation, allowing us to call it the combined human capital of the enterprise. This capital can be analysed, calculated, used, evaluated and compared. The same principle is used for the formation of sectoral, regional and national human capital, which is a set of individual and corporate human capitals, which, if certain proportions and reproduction conditions are preserved, make it possible to receive various types of income.

In order to manage any type of human capital, it is necessary to develop a scientifically sound system of indicators and evaluation parameters.

Human capital is an economic category characteristic of any individual, which can be assessed at any stage of his/her life activity. An individual can use it in various spheres of activity, including labour.

From the position of using human capital in labour activity, it can be labour capital, which is used in labour activity, and non-labour capital, i.e. not used in labour activity.

Used in labour activity with different degrees of usefulness, human capital contributes to the achievement of a certain economic effect, allowing to receive income or, in other words, to achieve certain rewarding results.

It seems to us that the identified functions of human capital may be of particular interest.

At the level of an individual, we have identified the following functions of human capital:

1) stimulating, contributes to the formation and development of the most necessary at each certain stage of development production qualities;

2) economic, which is manifested in the accelerated growth of profit due to the increase and realisation of knowledge necessary to ensure the movement of capital.

At the micro level, the following functions of human capital are distinguished:

1) prognostic. The study of human capital allows through the analysis of the relationship between opportunities and reality to assess the level of use of human capital of both individual employees and collectives and regions of the country and, on the basis of this analysis, to create conditions for improving competitiveness, innovation activity, economic growth;

2) production and economic. Human capital used by an individual is directly included in the process of production of goods and services. The higher the quality of an individual's human capital, the higher the quality of his/her labour activity, goods and services produced by him/her, necessary for normal life activity of people and satisfaction of their needs, and the higher it will bring income to the entrepreneur.

At the macro level, the following functions of human capital are distinguished:

1) strategic. Human capital acts as one of the elements contributing to the development of the state, the movement of scientific and technological progress within the state, as well as stable economic growth;

2) translational. Transfer from the past to the future of the human capital that society possesses. At the same time, only that part of the human capital that is in demand in the new time is transferred.

Many economists, comparing the accumulation of industrial and financial capital, in the definition of the essence of human capital include the process of its creation, which requires the diversion of funds from current use to achieve higher returns in the future, and also takes into account the following characteristic features [7, 11, 17] not separable from each other.

1. Unlike various types of assets, a human being cannot be a market commodity, unless we take into account the slave system. Consequently, the market provides prices only for the use of human capital in the form of rent (that is, in the form of wage rates). As a result, human capital is characterised by a minimum degree of liquidity.

2. The investment period is characterised by a longer duration. For example, education, a key form of investment in human capital, requires 20 years or more to reproduce, while industrial capital requires only three years for investment.

3. Human capital is characterised by a higher level of risk compared to the risk of investment in industrial capital. High costs of organising and controlling investments in human capital caused by migration flows, the payback period of investments, the underdeveloped labour market, and the lack of effective ways and mechanisms of risk management.

4. Investment income in human capital tends to increase. However, they are limited to the upper limit of working age, after which they are characterised by a decline, while the return on physical capital declines slowly as it accumulates. It should also be noted that returns to human capital can be in monetary and non-monetary forms. As a consequence, consumer aspects of human investments are sometimes more important than production aspects.

5. There is a saturation of the labour market with various institutional structures, due to the fact that the employer, acquiring the right to own human capital, enters into relations with a free individual who respects his rights.

6. Unlike other types of resources (natural resources, classical human resources and other types of capital), human capital needs to be invested in. Underdevelopment of human capital does not ensure high return on investment in high-tech industries as well.

7. According to the level of capital return, investments in human capital are the most attractive and efficient.

Individual human capital, according to some economists, consists of the following main components.

1. Knowledge as a set of information used in economic activity and ensuring the growth of its efficiency.
2. Skills as the ability to effectively carry out entrepreneurial and other activities.
3. Experience or professional skills that allow to perform specific labour operations for a long period of time.
4. Culture as a way of acting within the framework of knowledge, rules, traditions, morals accepted in society.
5. Motivation as purposeful activity, aspiration for development, including self-development, satisfaction with the process and results of their labour [6, 9, 11].

These components are the basis for the basic classification of types of individual human capital, including health capital, organisational and entrepreneurial capital, and intellectual capital.

Genetic capital is a set of mental, creative and general psychological qualities and gifts that play a significant role in human activity. It allows an individual to adapt to changing conditions, make the right decisions, and effectively master new knowledge and skills.

The main task of society, state and regional authorities in raising the level of genetic capital of an individual should be to assist in discovering and unlocking abilities, as well as their full utilisation in the interests of both society and each individual. At the moment, the problem is that many people's abilities remain undiscovered and unrealised, in which case society is deprived of a number of talented individuals. Consequently, the main task for preserving the existing genetic capital is to reduce such losses as well as their efficient utilisation.

Most researchers emphasise intellectual capital as one of the most important components of human capital [13, 18]. The growth of the level of labour productivity, as well as the increase in the return on capital investment is impossible without the growth of the level of intellectual capital development. Innovative economy, based on the achievements of scientific and technological progress, needs intellectual capital of a high level, this is due to the fact that with a low share of intellectual labour in human capital, investments in knowledge-intensive industries do not yield returns.

Relatively fast successes of such countries as Japan, Taiwan, Hong Kong, China, Korea, as well as new European developed countries (Spain, Portugal) prove that the development of human capital should be based primarily on a high level of culture of the population. This is also confirmed by the analysis of countries in transition, indicating that cultural traditions and mentality are the basis for the successful growth of education [15]. In the domestic economic literature, the concept of intellectual potential is identical to the concept of scientific potential.

Classification of human capital by types is possible according to different main features and for different purposes. Here it should be noted that many researchers emphasise the real and decisive role of intellectual capital. In fact, the products of intellectual labour can be fixed both in material form and as an intangible asset.

The analysis and assessment of intellectual capital are scientifically substantiated and reflected in practical recommendations for its assessment and effective use, which makes it possible to use the result of the scientific study of intellectual capital to analyse other components of human capital.

Summarising the results of the study, we can conclude that a person, possessing his human capital used in the process of professional activity, at the same time in terms of its importance is the main and in the structure of resources used. The final results of any production activity, first of all, will depend on the quality and efficiency of management and utilisation of this type of capital.

The transition of agriculture to the innovation path of development will inevitably cause changes in all the constituent elements of the economic system, providing natural transformations in the economy. In this connection, as a rule, there is a radical change in the development strategy of the agro-industrial complex, while the market changes depending on the ratio between accumulation and consumption, the production process finds its continuation in other stages (distribution, production consumption), which makes it possible to noticeably increase the price of consumption of the innovative product at a constant or even decreasing production price.

In the process of transition to the innovative way of agricultural development, there is an increase in the complexity and growth of balanced complex resource provision of the economy of the agro-

industrial complex. These trends force the authorities of various structures to develop the following directions:

- to concentrate investment resources, as well as to increase the efficiency of their use on the main directions of NTP of agro-industrial complex industries;
- to form highly qualified human capital of the world level;
- promote motivation to systematically improve the level of education and professionalism of employees;
- improve the system of financial support for innovation activities in all spheres of the agro-industrial complex;
- provide all sectors of the agro-industrial complex with the necessary information, as well as data on new technologies, market structure, innovative products, etc.;
- improve the investment climate in the regions of the country to attract foreign and domestic investment capital.

To identify the directions of innovative management of the quantity and quality of human capital as the main elements of reproduction, it is necessary to develop the scientific theory of forecasting and assessment of labour potential both in the country as a whole and at the level of individual regions.

To do this, it is first necessary to define the meaning of the category "labour potential". Labour potential is the potential quantity and quality of labour resources at the disposal of economic entities of a given region, existing in the present and predicted in the future period. The main directions of increasing the labour potential of agro-industrial complex industries include improving the quantitative and qualitative components of human capital.

The definition of the category "labour potential" raises the question of the degree of importance of such constituent elements of human capital as quantity and quality. For this purpose, it is necessary to determine the structure and hierarchy of objectives.

The main objective of the development of labour potential of the agro-industrial complex is to meet the needs of production. Based on the set objectives, the following target benchmarks can be identified:

- preservation and development of the village, ensuring food security of the country. The disadvantage of such goal setting is that there is an outflow of capital investments from other sectors and, as a result, stagnation of economic development as a whole due to inefficient use of funds;
- creation of competitive agricultural production. In modern conditions, this is the best option for the development of the agro-industrial complex. However, even here we can identify certain disadvantages, which include the following circumstance: according to the theory of comparative advantage, the production of certain groups of goods may not be competitive due to the influence of natural and climatic features, production conditions and other factors (for example, the lack of a developed logistics system, low level of market development), and this leads to the need to create specialised production, which, in turn, may be in conflict with the policy of food and agriculture.

Hence, it follows that the last of these goals should be considered optimal, with significant inclusions of the first one in those situations where it coincides with the goal of the state, taking into account the fact that some costs arising from the production of products of the agro-industrial complex of the region, in solving the state tasks to ensure food security of the country should be reimbursed from the federal budgets.

Having defined the creation of competitive agricultural production as the main goal of agro-industrial complex development, we come to the following conclusion that the main method of increasing the competitiveness of the agro-industrial complex of the country and regions is investment in innovation, with the help of which the following results can be achieved:

- increase the level of labour productivity;
- reduce labour intensity and material intensity;
- optimise the management structure;
- make high-quality marketing decisions;
- improve the reproduction structure of human capital.

Achievement of such results is possible on the basis of a close relationship between science, production and education.

The described type of development requires giving more weight to the qualitative component of labour potential than to its quantity, so the main direction in the development of reproduction processes should be given to this component.

When developing methods for managing the system of human capital reproduction, it is necessary to identify the components of such a system by elements and analyse them. From the very definition of the category "human capital" we can identify that the main constituent elements of human capital reproduction are qualitative and quantitative components, so it is advisable to reveal each of them more specifically.

The economy distinguishes two main ways of quantitative reproduction of human capital - migration and natural reproduction.

For natural reproduction the most important elements are: - increase in the birth rate; - reduction of mortality rate; - the level of basic education.

Improvement of the migration component can occur in two ways: - increasing the number of people coming to the territory (immigrants); - reduction in the number of those leaving the territory (emigrants).

It should also be noted that human capital is subject to attrition, the main reasons for which are: - reaching retirement age; - complete or partial loss of labour capacity; - emigration to other states.

From the above, it can be concluded that in order to increase the level of human capital endowment it is necessary to: - to stimulate immigration of able-bodied persons to the region; - increase the birth rate; - create opportunities for the population to receive secondary education;- promote the health of the population; - regulate the retirement age; - increase life expectancy; - reduce the mortality rate of the working-age population, as well as morbidity and traumatism leading to disability; - limit (indirectly) the emigration of able-bodied persons.

A comparative analysis of the advantages and disadvantages of the directions of growth of human capital endowment is given in table 1.

Table 1. Advantages and disadvantages of human capital endowment growth areas.

Ways to increase security human capital		Advantages	Flaws
Increased immigration		Allows you to manage the structure of human capital	Dependence on external conditions, problems with socialization
Birth rate growth and level of training		Allows for enhanced reproduction	Long lag between activities and effect, complex relationship between activities and effect
Decline in emigration		Does not require extraordinary measures, it is enough to provide the necessary minimum	Does not allow increasing labor potential, but only prevents its reduction
Reducing natural attrition of human capital	Decrease in mortality	Gives great returns per ruble invested into education	The effect is limited, marginal costs per unit of effect increase rapidly (find optimal)
	Reduced morbidity and disability	Reduces the burden on social security	
	Raising the retirement age	Saves pension costs	Negative social and political effect

Source: built by the author on the basis of [12, 13].



In our opinion, from the position of the ratio of effect and costs in the short term, the most expedient solution to the problems of growth of human capital provision through the immigration of highly qualified human resources (human capital). Many foreign enterprises follow this path, attracting qualified foreign workers for the period of seasonal work (sowing, harvesting, etc.).

A similar method is used by US scientific institutions, which attract experts in various fields and prominent scientists from other countries.

In the long term, the most correct way is to develop our own system of training and retraining of specialists, to guarantee domestic personnel a high level of wages, and to create decent working conditions comparable to those created for foreign specialists.

For each element of the human capital reproduction system, the main factors of influence and conditions contributing to the improvement of human capital endowment are identified (tab. 2).

The data in Table 2 show that certain difficulties are caused by attracting and managing qualified human capital, since its retention and development require not only the presence of certain factors and conditions, but also the observance of a whole set of conditions.

The previously considered elements of human capital reproduction characterise, first of all, their quantitative component. However, at this stage of economic development, the quality of human capital comes first, especially when building an innovation-type economy.

Table 2. The main elements affecting the system of human capital reproduction.

System elements reproduction human capital		Impact factors and conditions for improving the provision of human capital	
		Labor force low qualifications	Highly qualified workforce
Increased immigration		State of demand for labor resources.	Cultural and linguistic proximity. Relatively high wages. Relatively high quality of life. Lack of legislative and bureaucratic barriers. Tolerance towards visitors.
Decline in emigration		State of demand for labor resources. State support for the unemployed.	Sufficient level of quality of life. Wages adjusted to their conditions are no worse than alternative ones, both by territory and by type of economic activity. Social services
Increase in birth rate and education		Acceptable quality of life. Benefits for material stimulation of fertility.	Material security of the population. Provision of accessible educational, educational and medical institutions.
Reducing natural attrition of human capital	Decrease in mortality	Reducing crime rates, drug addiction and alcoholism. Increasing the provision of household services.	Injury hazard in production and transport. State of the environment. Availability and accessibility of medical facilities for prevention and treatment.
	Reduced incidence rate		
	Raising the retirement age	Increasing life expectancy and improving the health of citizens	Job satisfaction.

Source: built by the author on the basis of [13, 15].

The Human Development Index (HDI) is used to compare the quality of human capital (especially in international practice).

At the moment, a system of indicators defining quantitative and qualitative socio-economic aspects of social development has been developed and scientifically substantiated, consisting of three types of indicators:

- Health (longevity) index, or life expectancy at birth (LIFE), which demonstrates differences in the level of health in different countries and regions;
- education index, which determines the extent to which the level of education of the population in one state (or region) exceeds the level of education (literacy) of the population in another country;
- income index, which determines the level of economic development of the analysed states or regions, estimated through GDP in purchasing power parity (PPP), in US dollars, per person. The human development index is calculated in the following sequence [11, 13].

Private indices are calculated using the following formula:

$$Index = \frac{X_i - X_{min}}{X_{max} - X_{min}}$$

The income index is calculated through decimal logarithm.

$$W(Y) = \frac{\log y_i - \log y_{min}}{\log y_{max} - \log y_{min}}$$

The final human development index is calculated as the arithmetic mean sum of the values of the three components.

In our opinion, it is necessary to systematise the indicators related to the quality of human capital.

One group should include indicators expressing those characteristics of human capital that directly affect the degree of their use in the production process, for example, the level of qualification of employees, while the second group should include indicators that characterise the impact on the values of the indicators of the first group, for example, the state of health.

The characteristics of human capital that have a direct impact on the efficiency of their use in production include the following:

- level of education;
- experience and professional qualification;
- economic activity of the population;
- correspondence of supply and demand in the labour market by categories of specialists;
- ability to develop, including self-development (motivation).

The values of the indicators of the first group are influenced by the following factors:

- age structure of the population;
- life expectancy;
- gross regional product per person;
- the level of drug addiction, alcoholism, etc;
- development of health care;
- provision of basic living conditions.

Among the above-mentioned indicators, the most important is the conformity of knowledge and professionalism of personnel to the basic needs of production, as well as the duration of the period during which this conformity is achieved.

The change of production requirements to the level of human capital development in the process of innovation development requires the creation of a system of ways to manage the quality of human capital.

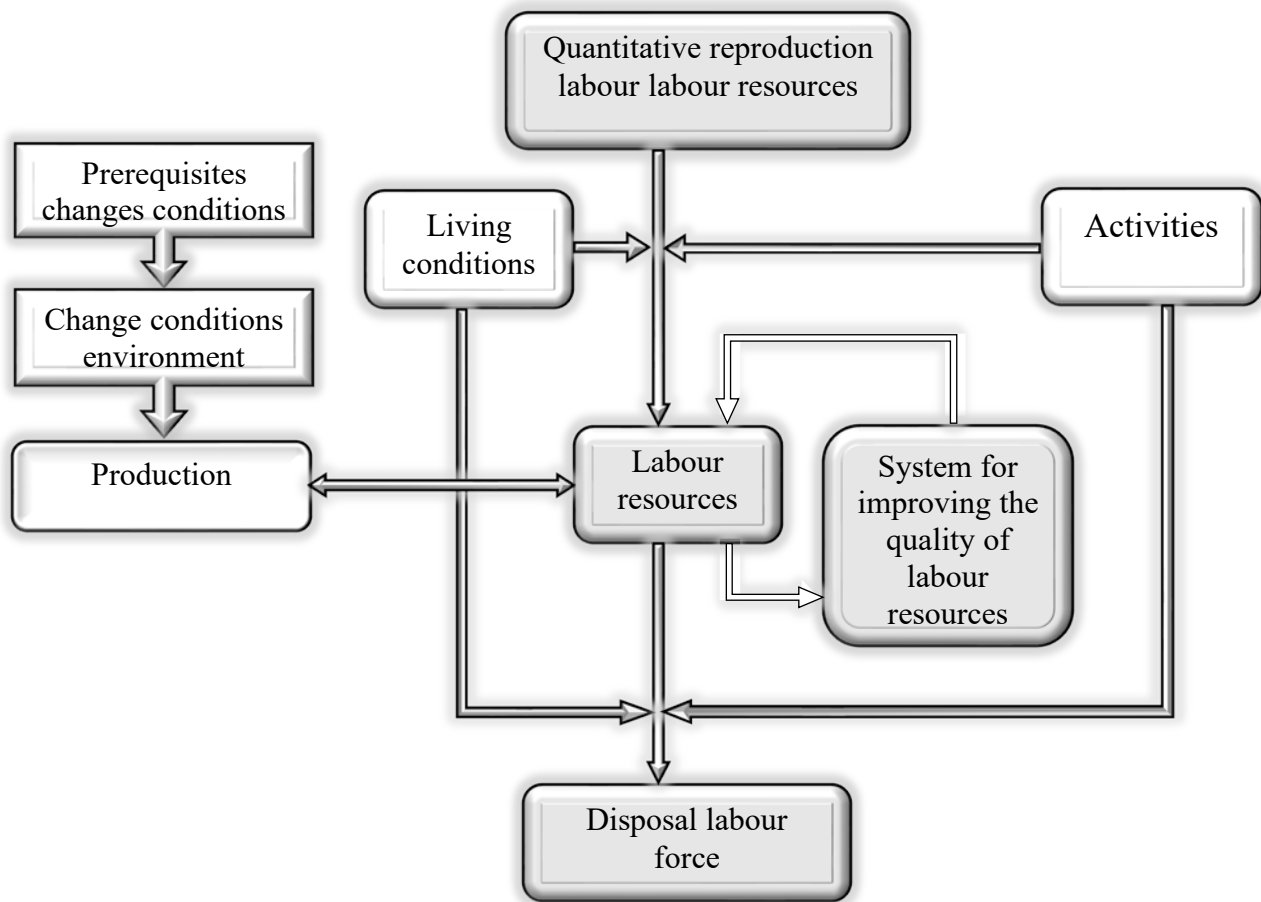
The management of human capital quality is obviously reduced to the processes and methods of its maximisation. However, this cannot be said about the management of the quantitative component. Firstly, its increase is associated with a significant increase in costs and a higher risk that these costs will not be effective enough; secondly, there is a probability that the quantitative component will prevail over the qualitative one (such a situation may occur in case of a shortage of labour resources).

The optimal combination of quantity and quality can be called such a combination, in which the number of economically active population in any period of time was not less than the value of the

number in previous periods and is as stable as possible. Observance of this condition will make it possible to avoid instability in the labour market and thus prevent the growth of the demographic load coefficient.

Formation of the quantitative component of human capital is a rather difficult task, so it is necessary to ensure its acceptable level, and the correspondence between supply and demand on the labour market should be achieved by managing the production needs in personnel, bringing them in line with the available amount of human capital by changing, for example, labour intensity. This conclusion is also justified by the fact that approximate forecasting of the amount of human capital available in the future is a relatively simple task.

The system of human capital reproduction may undergo changes when it is affected by changes in the external environment and changes in the production environment. The sequence of these changes is schematically presented in figure 2.



*Figure 2. Human capital reproduction system.*

Source: built by the author on the basis of [7, 14].

It should be noted the sequence of changes in the system of human capital reproduction under the influence of changes in the external environment and production environment.

1. Changes in the external environment will entail changes in production.
2. Changes in production will lead to changes in the structure of the labour market, and these changes will affect both quantitative and qualitative aspects.
3. Changes in the structure of demand on the labour market will in turn lead to changes in the requirements for retraining and vocational education, as well as in the attraction of new skilled and low-skilled workers.

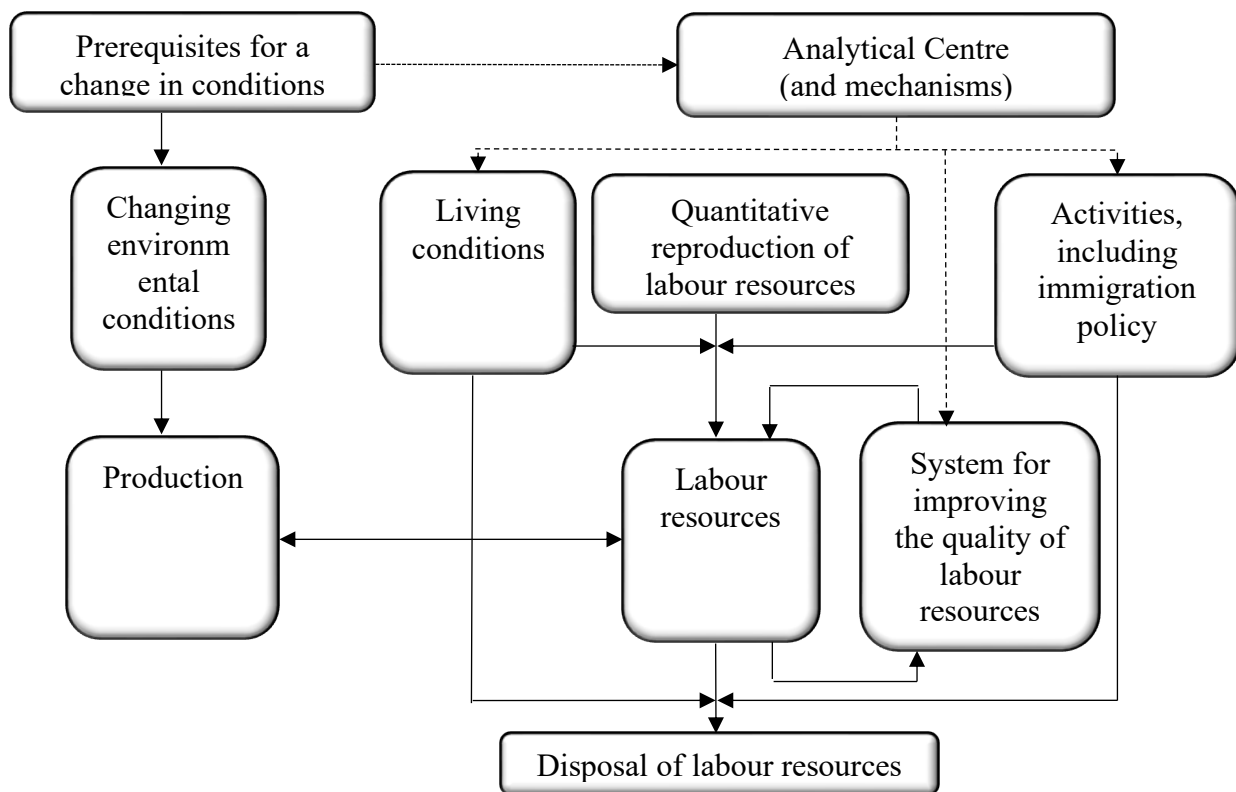
4. Changes in the requirements for retraining and vocational education will require retraining of personnel at enterprises.

5. Retraining of the workforce in enterprises will lead to an increase in the quality of labour offered.

6. Improving the quality of labour offered will satisfy the need to change production.

Having analysed this scheme of transformation of the system of reproduction of human capital, it should be noted that at each stage there will be some slowdown due to the inertia inherent in each subsystem. As a result of these processes, the speed of adaptation of production in response to changes in the environment will be insufficient.

Such a problem arising will be solved in two ways by: 1) increasing the sensitivity of each subsystem to changes occurring in each of the interrelated subsystems and reducing the inertia of the reaction of these subsystems to changes in the state of the related subsystem; 2) moving to a process of adaptation of the production system. In this case, it is necessary to create an analytical centre that would conduct analysis and help each of the subsystems to determine in advance the directions of probable changes (fig. 3).



*Figure 3. Human capital reproduction system with regard to the presence of a guiding analytical centre.*

Source: built by the author on the basis of [8, 13, 16].

In our opinion, the think tank should not replace the market as a system of regulation due to the fact that, as historical experience shows, it is the market that allows the economy to develop optimally in the long term.

The quality of life and social infrastructure in rural areas is known to be lower than in urban areas. The factor compensating this difference may be higher profitability in agricultural production. However, at the moment the level of real money income in rural areas is lower than in the city.

From the above, we can conclude that people in rural areas are held back by several factors: low level of professional education and, consequently, the inability to find a high-paid job in the city, lack of money to move, as well as historical immobility, or unwillingness to change the usual way of life.

Undoubtedly, the attempt to improve the quality of labour potential in rural areas under the current conditions of social infrastructure development and the level of profitability is obviously a failure because improving the quality of labour resources will remove the existing conditional restrictions that keep people in rural areas, and, as a consequence, will lead to the migration of able-bodied and educated population to the cities.

In our opinion, this situation can be changed in the following way.

1. It is necessary to encourage the transfer of the most labour-intensive and least land-related agricultural production and processing to areas of high population concentration, where social infrastructure should be developed to provide the population with a high quality of life (currently, achieving such a level throughout the country is difficult and often not economically feasible).

2. For the population remaining in rural areas and whose labour activity is directly related to work on the land, it is necessary to provide increased profitability.

The implementation of these and some other measures will make it possible to carry out activities to improve the quality of human capital of the agro-industrial complex as a whole.

In modern conditions of innovation-oriented development of the economy it is important to revise the existing views on the category of "human capital" and the process of its reproduction. As is known, in the pre-reform period the problems of reproduction of human capital were mainly reduced to the denial of the properties of labour force as a commodity. It was argued that labour power had no monetary value and was represented as an aggregate labour force. Reproduction of labour force was the goal of socialism, and it was defined as the most complete and comprehensive reference point for the development of the members of society. And as a result, wages were one of the centrally established planned norms, characterising the distribution of the country's national income among workers depending on the costs of their individual labour [12, 15].

At the same time, it should be noted that this approach loses the objective basis for determining the quantitative value of wages necessary for the normal reproduction of human capital due to the fact that the planning of wage levels was not based on precise quantitative parameters that determine the level of costs of reproduction of human capital and its price, and there was no clear definition of indicators of its sectoral, intersectoral and intrasectoral, as well as territorial differences.

In the transition to a market economy, human capital begins to act as a commodity, the price of which is determined by the labour spent on the production of means of subsistence. It should be noted here that the distinction of human capital as a commodity includes the size of compulsory needs and ways of their satisfaction, which, in turn, determine the size of the value of human capital and represent a set of habits and life requirements of workers.

It follows from the above that the size of the value of human capital, unlike other types of goods, includes historical, moral and cultural aspects. At the same time, since labour remuneration should guarantee normal working and rest conditions for both the worker and his family members, the market mechanism in this situation establishes the minimum wage that will solve this problem.

Differences in the level of wages in different sectors of the economy, first of all, will depend on the situation on the labour market, i.e. the availability of supply and demand for each specific type of labour, as well as on differences in the complexity, intensity and prestige of certain types of work. The competitive market is also able to identify differences in productivity and professionalism of individual workers and express these differences through wage differentials. As a consequence, in the conditions of a socially oriented labour market on the basis of optimal wage differentials should ensure the activation of the production function of this market, and not only the reproductive function.

Having analysed the structure of labour reproduction costs, we can determine that the volume and share of wages in GDP tend to increase. To some extent, this is caused by a sharp decrease in the provision of free state social services, which mainly include: health care, education, housing. This is due to the fact that under market conditions many socially important goods and services have become commodities, and there is a need to include them in the costs of reproduction of human capital.

The analysis shows that in society in general and market relations in particular, the approach to determining the true value, quantity and quality of human capital in reproduction processes is changing dramatically, the changes come from the principle that everything has its price. In this situation, market

regulators are relatively universal and the only means of providing an opportunity to objectively measure and evaluate labour activity and labour results both at the level of an individual enterprise and society as a whole.

Undoubtedly, in order to realise this type of reproduction of human capital, it is necessary to guarantee the fulfilment of some conditions.

1) to increase the level of labour productivity and the development of production forces and relations;

2) to create a free labour market, providing opportunities for high mobility of labour force, as well as its inter-sectoral transformation.

Taking into account that overcoming the problems of formation of a competitive market and compliance with all its conditions is a rather difficult task, it is unreasonable for the state to refuse to regulate reproduction processes at the initial stages of market regulation. However, it should also be noted that a return to the previous system of human capital reproduction with a high share of state participation is no longer possible.

The peculiarity of human capital reproduction is inextricably linked to the current conditions of market functioning. Firstly, individual reproduction processes are intensifying, and secondly, the market is saturated with various regulatory institutions. These peculiarities determine the need for the formation of scientifically substantiated ratios between the costs of reproduction of human capital and the price of labour.

All this, in turn, requires a clear separation and definition of the categories of skilled labour and skilled worker. According to the authors' collective [11] it is necessary to abandon the concept of "qualified" when using the term "cadres", due to the fact that there is some contradiction in this combination. Applying the concept of "cadres", we assume that these are qualified workers who have undergone some specific training or retraining. But it should be taken into account that this is a historically established concept and therefore there is no urgent need to take it out of scientific circulation, especially when it comes to large agricultural production.

On the other hand, in modern conditions, due to the complexity of agricultural production and strong differentiation of its technical and technological equipment, there is a multivariant intertwining and combining in the labour of one worker the performance of duties of a skilled worker, specialist and manager. This situation is especially characteristic of private subsidiary farms of commodity type, households organised by those specialists who worked in collective farms of the former Soviet Union (engineers, zootechnicians, agronomists, veterinarians, etc.). The labour activity of such workers simultaneously intertwines both highly skilled and low-skilled labour. There is a need for skills in management, organisation, trade and supply. In this situation, it is difficult to classify and differentiate such labour. But, if such a worker has other workers in his subordination, then a completely different situation arises.

Nowadays, the theory of human capital management distinguishes many approaches to the classification of labour personnel or staff. Classification by categories of workers is considered to be the main one. A.V. Karpenko defines the category of "workers" as production personnel, which carries out its participation in material production with a large share of physical labour [8, p. 47-48], and production personnel is divided into the following components:

1) main workers - personnel engaged in the main production;

2) auxiliary workers - personnel, as a rule, engaged in auxiliary production;

3) service workers - personnel engaged in servicing other units of the enterprise.

The main criterion of attributing personnel to a certain type through the share of physical labour in the volume of production is, in our opinion, rather controversial due to the fact that in this situation the specific content of labour, its complexity, intensity and other other indicators will not be taken into account.

Due to the specifics of agricultural production, there are many working professions associated with the expenditure of physical labour and at the same time requiring high professional skills and extensive work experience.

At the same time, one cannot ignore the fact that the new generation of machines used in recent times in most cases considerably simplify quite complex processes and make it possible to operate such machines and processes even by unskilled workers. In our opinion, this position is quite ambiguous, and it would be wrong to adhere to such a one-sided position due to the fact that in this case there is a denial of the impact of the development of knowledge-intensive industries and increasing the level of labour mechanisation on the labour of workers in general.

In the conditions of transition to post-industrial economy, further development of all branches of the agro-industrial complex, introduction of robotised equipment and technologies, the working functions of workers are being relegated to the background due to the fact that to a large extent the specific working functions are being reduced to control over automated processes. But at the same time, such characteristics as responsibility and risks for labour results are coming to the fore, which significantly changes the nature of work itself.

In the new conditions of production from workers are required not so much the cost of physical labour as mental, as the importance of speed of decision-making in general and speed of decision-making in non-standard situations especially, increased attentiveness, ability to analyse to make optimal decisions increases.

Our research has shown that new imported machinery is easier to operate than domestic analogues, and the mechanic learns it quite easily. But at the same time, proper operation and efficient labour on this equipment is quite complicated. In some functions the labour of mechanics is increasingly intertwined with engineering, and there is a need to form a high culture and economic thinking of workers, including the need for serious general education and professional training. Consequently, the seeming simplicity of mastering new machinery and modern technologies is deceptive.

Thus, in general, technical progress in the industry puts forward new requirements to workers. At the present stage of development, while simplifying individual labour functions, a worker should correspond to the whole system of productive forces and production relations in agriculture. At the same time, the hitherto existing statement that a worker should be universal and master several related professions becomes irrelevant and should be changed taking into account the current trends in the development of agro-industrial production: the thesis under consideration should combine several provisions simultaneously: from those based on the use of low-skilled labour to high-tech, resource-saving ones.

Taking into account the multiformity that has developed in agriculture to date, in the conditions of introduction of achievements of scientific and technical progress, it becomes especially relevant to identify the basic part of training of a highly professional worker, as well as the system of advanced training.

These aspects of the problem were theoretically reflected in the works of Zhuravlov I.V., Kudlai A.V. and other researchers in the 80s of the twentieth century. They determined that multi-structure production will eventually increase the demand for workers of different levels of professional training. At present, these issues are also relevant, but some clarifications are required due to the fact that in the Russian conditions of those years it was exclusively about the development of large-scale agricultural production, and the emergence of small-scale producers along with these forms of management was not even expected [7].

L.M. Dyba also analysed the above-mentioned problems, highlighting the need for the development of specific professional standards on which the existing education system would be based [6]. In the works of this author there are no certain proposals for the construction and implementation of a set of standards in secondary, primary vocational and higher education. An essential feature of the reproduction of qualified personnel in the agro-industrial complex is the interrelation of this process with changes in the structure of capital. Having analysed the experience of developed countries, we can fully identify the trends of labour productivity growth in the industry, as well as the reduction of unemployment. At the same time, due to the specifics of agro-industrial complex development, at a certain stage there is a displacement of not only low-skilled, but also partially highly skilled workers by high-tech machines and apparatuses. In the agrarian sector, unlike in industry, these phenomena occur at a more intensive pace.

For example, in the United States, the agricultural industry, with a relatively small share in GDP, is a powerful efficient and highly productive system, where one worker engaged in agro-industrial complex provides up to one hundred residents of the country with its products. [15]. Such changes became possible only due to the improvement of professional characteristics of employees working in the agrarian sphere.

Often when analysing the available economic literature, it can be noted that there is an unfair underestimation of the role of the "working class" in increasing the level of efficiency of agricultural production. Thus, according to some authors, the main source of development of economic relations and increasing the level of efficiency in the industry are managers, as well as the staff of scientific and technical organisations. In our opinion, this opinion is erroneous. Undoubtedly, the growth of public labour productivity in the agrarian sphere is the result of the activity of all aggregate forces aimed at its achievement, nevertheless, it would be inappropriate to underestimate the importance and the need for qualitative changes in the reproduction system of qualified personnel. This position is also supported by the fact that in developed countries during the last decades measures to improve the system of primary vocational education in the branches of agro-industrial complex have been implemented [13].

Most researchers link the potential for growth of labour productivity level of skilled workers in the agricultural sector of the economy with a clearly traceable trend towards a decrease in their total number with the level of development of the material and technical base of the industry, which, in their opinion, predetermines the qualitative and quantitative structure of skilled workers' employment. In the pre-reform period, when quite a lot of scientific research was carried out in our country, it was proved that the growth of professionalism of mechanic personnel contributed to the growth of labour productivity and increased efficiency of agricultural production [9].

The sharp increase in competition from developing countries in the sphere of production of material goods, the need to continuously improve the level of labour productivity oblige large monopolies, including in the agricultural sector, to increase the level of investment in initial professional training, as well as to improve the level of qualification of existing workers.

The problem of a clear distinction between skilled and low-skilled labour in the agricultural sector is one of the principal ones within the framework of the topic under consideration. Studies and debates on this issue, which began in the late twentieth century, have not resulted in clear-cut recommendations. To this day, some economists still classify workers as skilled according to the level of mechanisation of the worker's labour. All other labour falls under the category of unqualified, although it in turn requires both great professionalism and special experience.

To a certain extent, we agree with the opinion of S.J. Vovkanich, L.K. Vovkanich and L.K. Vovkanich. Vovkanich, L.K. Semiv, who note that there is a mixing of concepts, skilled and unskilled labour is identified with mechanized and manual labour [2, p. 15]. In our opinion, this is unacceptable. There should be a division of labour according to the specific content and complexity, regardless of whether this labour is associated with the use of machines or not. In this regard, the non-mechanised labour of a shepherd, milkmaid, vegetable grower, beekeeper is not only very complex, but also requires a great deal of experience and knowledge, and often the presence of intuition, so it is unique in its own way. The loss of even a small amount of past experience in the most important agricultural jobs will lead to a rapid deterioration of product quality. At the same time, there is no need for specialised training among workers in the industry whose work is related to machines, only brief instruction.

The above does not mean that unskilled labour is completely absent in agriculture, especially when it comes to the performance of individual operations inherent in complex labour, such as the highly skilled labour of a farmer. At the same time, there is a need for additional analysis of the degree of reduction in the share of unskilled manual labour in the industry during the development of knowledge-intensive industries due to the fact that in these processes not only unskilled labour, but also, until recently, skilled labour is displaced from the industry.

**Keywords:** intellectual potential, employees, intellectual capital, capital, management mechanism, innovation development, evaluation, agricultural innovation system.



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