Methods for elaborating a human capital development strategy

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Abstract. The paper is devoted to elaborating the methodology for determining the elements of a strategy for human capital development in the agrarian sector. It highlights the ways of formation of a strategy for human capital development, such as PEST (STEP) analysis; Porter’s five forces framework; SWOT analysis; SNW analysis; methods of demographic forecasting including methods for predicting changes in the age-sex structure of rural population and migration flows analysis; methods of economic and mathematical modeling with their certain specification for research purposes. It is proved that consistent use of the considered methods allows a comprehensive approach to the elaboration of a strategy for human capital development in the agrarian sector.

1. Introduction
At present the problem of integrated development of human capital in the agrarian sector is one of the priorities of national policy in the socio-economic development of the country. The importance of formation of human capital development strategy proceeds from the fact that, on the one hand, it can be subjective. Its subjectivity arises from the essence of “human capital” category and peculiarities of its reproduction in both quantitative and qualitative aspects. The formation of a development strategy by the main elements a priori involves a significant number of existing spheres of public life, and its implementation can have a positive impact not only on increasing the efficiency of agricultural production, but also on the level and quality of life of the population residing in rural areas [1-4].

On the other hand, human capital, being a subsystem of agricultural production, is directly involved in the creation of gross national product, as a result of which the formation and implementation of a human capital development strategy in the agrarian sector will contribute to the achievement of goals outlined in the country’s Food Security Doctrine, which in turn will help to achieve stability of the national economy in external economic conditions.

2. Materials and Methods
The authors used different methods of economic and mathematical modeling (i.e. comparative method, abstract-logical method, method of interpretation, etc.) with their certain specification for research purposes.

The process of elaboration of a strategy for human capital development in the agrarian sector...
should be considered as a specific type of activity that takes into account the peculiarities of formation and use of human capital in the agri-food sphere and is aimed at predicting the future state of not only the reproductive aspects of human capital development, but also the entire system of agricultural production.

Human capital of the agrarian sector has a number of characteristic features discussed earlier [5, 6]. Therefore, strategic planning of human capital development has certain peculiarities and includes several successive stages, the completion of which presupposes achieving the set goal:

- analytical stage involves the analysis of macro- and microenvironment; assessment of the current state of human capital development indicators in quantitative and qualitative aspects, as well as determination of prospects (trends) of their development with the account of strategic parameters of development of the agri-food sphere. The result of this stage is the identification of potential competitive opportunities and existing limitations;
- development stage implies the formalization of constituent elements of the strategy, alternative options, and directions for human capital development in the agrarian sector, allowing to overcome the identified limitations;
- evaluation stage provides for an assessment of a probable state of human capital development as a result of impact of the developed strategy and its options.

The key stage in the formation of a strategy for human capital development in the agrarian sector is strategic analysis of internal and external environment.

The main objective of analyzing the external environment is to identify future threats, and in case of the internal environment it is to determine the opportunities for human capital development in the agrarian sector.

3. Results and discussion

The main methods of strategic analysis are PEST (STEP) analysis, Porter’s Five Competitive Forces Framework, SWOT analysis, and SNW analysis. Consistent use of these methods allows for a comprehensive study of internal and external factors that have a direct impact on human capital formation. It also allows identifying priority areas in the adopted strategy for human capital development in the agrarian sector.

**PEST (STEP) analysis** is used to analyze the macroenvironment. Its methodology is based on defining the external (exogenous) factors classifying them into political, economic, social, and technological groups [7]. The use of this method in the process of elaboration of a strategy for human capital development in the agrarian sector makes it possible to assess the state of the labor market and to gain an insight into the position of human capital in the agrarian sector, its potential and prospectivity of development directions.

A stylized example of a PEST analysis matrix for evaluating strategic parameters of human capital development in the agrarian sector is presented in figure 1.

![Figure 1. A PEST analysis matrix for evaluating strategic parameters of human capital development in the agrarian sector [8].](image)
country in the development of its rural areas as a spatial basis for the formation and use of human potential and human capital in the agrarian sector (through analyzing the existing regulatory and legal framework), and secondly, to assess the institutional environment with which the state is able to implement its policy.

Studying the economic factors makes it possible to understand (at the level of the country and its regions) how the economic and financial resources are formed and distributed by the key areas, which regulate the formation and development of human capital in the agrarian sector.

Studying the social factors is a mandatory stage in the strategic analysis of the macroeconomic environment of human capital in the agrarian sector due to the fact that it allows getting a detailed view of the prospects for human capital development in the agrarian sector from the perspective of analyzing the current state and prevailing trends of such social phenomena as number and gender composition of rural populations, population structure by working age, migration activity of the working population, quality of life in rural populations, etc.

Identification of technological factors involves the analysis of promising research and development works (R&D), as well as achievements of scientific and technological progress (STP) and the opportunities for their practical implementation in enterprises of the agri-food sphere in order to predict their potential impact on the labor market in terms of changing its size and structure (demand for certain types of professions), requirements for the professional qualification level, skills and abilities of workers, etc.

As a link between the factors of external environment investigated in PEST (STEP) analysis and the factors of internal environment, Porter’s Five Forces Framework can be considered.

Porter’s five competitive forces framework is intended to specify the objectives of the business venture or project and identify the internal and external factors that are favorable and unfavorable to achieving those objectives. It allows elaborating a development strategy based on inherent competitive advantages determined by the analysis of competitive environment and its five main constituent elements:

- Bargaining power of buyers;
- Bargaining power of suppliers;
- Threat of new entrants (Entry of competitors);
- Threat of substitutes;
- Rivalry among the existing players [9, 10].

This framework is used and practiced by business entities to analyze the business environment and acts as one of the key strategic management tools. The objective of its use is, on the one hand, to create alternative development strategies, and on the other hand, to minimize medium-term and long-term risks through studying business processes.

In our opinion, this method can also be used not only in the context of strategic analysis of strategic opportunities and prospects of an economic entity in a market environment, but also for the purpose of determining and assessing the strategic parameters for human capital development in the agrarian sector. However, the correct use of Porter’s five forces framework requires its modification towards specifying the key elements of this method (i.e. the five competitive forces) in accordance with the research objective.

We proceed from the assumption that competition has a positive effect on the level of human capital development in the agrarian sector, but at the same time, it is important to determine the intensity and strength of competitive forces and to find such balance in which the human capital of the agrarian sector will be, on the one hand, maximally protected from the negative impact of competitive forces, and on the other hand, would at the same time ensure the maximum return on its use for all interested parties (e.g. employee, industry, and society as a whole).

“Buyers” of human capital will be represented by enterprises of the Agro-Industrial Complex, which provide the demand for labor and thereby form the labor market.

The power of buyers is explained by the fact that the labor market in rural areas has features of monopsony (oligopsony). As a result, commodity producers have the opportunity to intensify
competition in the market by imposing higher requirements on the quality component of human capital (e.g. knowledge, skills, etc.) and at the same time pushing the wages down. In turn, higher requirements for professional and qualification level induce employees to spend additional time and money on training and retraining, which inevitably leads to an increase in the opportunity cost of time. Otherwise, employees have to agree to a wage that does not meet their expectations (needs). In any case, all this has an adverse effect on the living standards of the rural population and its motivation for high-quality and highly productive work, which ultimately can become a driver for the development of migration processes.

“Suppliers” should include educational organizations of various levels (secondary, secondary professional, and higher educational institutions), which determine not only the qualitative level of human capital, but also the labor market saturation with workers of certain professions.

Educational institutions have a direct impact on the competitiveness of human capital in the labor market due to the specifics of services they provide. On the one hand, this happens through the formation of basic and professional competencies in students. The higher the professionalism of educators and their infrastructure potential (especially in higher educational institutions subordinate to the Ministry of Agriculture as the main talent pool for agricultural sectors), the higher the qualitative characteristics of human capital in the agrarian sector, and vice versa. On the other hand, impact is exerted through establishing the prices for education, thereby influencing its availability, which directly influences the number of students in certain training programs, and, consequently, the total number of potential workers in certain types of professions.

New entrants (competitors) will be international immigrants, as well as non-alien population involved in shuttle migration. Here attention should be paid to immigration of not only highly qualified workers, but also low-skilled workers, due to the specifics of labor activities in the agri-food sphere (i.e. a large share of manual and at the same time hard work with a relatively low level of wages).

The power of influence of development of migration processes is of particular importance, since the lack of labor resources is one of the key factors limiting the realization of economic potential of the agri-food sphere. It reflects a systemic crisis in the development of not only agricultural sectors, but also rural territories. Arduous work environment, low profitability, underdeveloped social and engineering infrastructure, etc. have a detrimental effect on the desire of the rural population to associate their labor activity with agriculture. This is due to the fact that enterprises of the agri-food sphere are the main employers in rural areas and in most cases act as village-forming enterprises. A natural result of this is an outflow of employable population from rural areas, which only aggravates the situation that is complicated enough. However, despite all the listed difficulties of working and living conditions in rural areas, the implementation of state policy towards increasing migration activity and stimulating immigration of employable population to rural areas is a necessary and critically important condition for the development of a competitive environment in the agrarian sector.

Substitute products in this case are the results of implementation of achievements of scientific and technological progress (STP) and research and development works (R&D) in the production activities of business entities (e.g. automation and mechanization of agricultural production, informatization, etc.).

Scientific and technological progress and practical implementation of its results into the activities of agrarian enterprises are natural processes of development of science and technology. They have a highly positive effect on reducing the labor intensity of agricultural production, increasing the level of its profitability and efficiency. However, at the same time, innovations in production (e.g. high-performance machinery and equipment, etc.) and in management (e.g. accounting information systems, online accounting, etc.) also affect the characteristics of human capital in both qualitative and quantitative aspects. For instance, the need for the number of workers required for performing business processes decreases, and at the same time, qualitatively new requirements to the skills of potential employees are being imposed by employers.

Intra-industry competition will be represented by competition in the labor market, caused not only...
by the complex development of selected elements of competition, but also by the demographic policy pursued by the state.

Rivalry in the labor market will be reduced to various ways of striving to improve the market position in order to obtain the most profitable offer. Competition has a positive effect on improving the qualitative characteristics of human capital, including the one expressed in the growth of workers’ desire for self-training and retraining. At this point, one of the key tasks of the state is to form a healthy competitive environment, preventing the situation of excessive competition, which would cause a migration outflow from rural areas to other regions (countries) or sectors of the economy.

Michael Porter developed the five forces framework as a reaction to SWOT analysis, which he found lacking in rigor and ad hoc. Nevertheless, it is generally accepted that SWOT analysis can be used to generalize and systematize both external and internal factors of environment:

- set objectives (defining what the organization is going to do);
- environmental scanning;
- analyzing existing strategies;
- defining strategic issues;
- developing new/revised strategies;
- establishing critical success factors;
- preparation of operational, resource, projects plans for strategy implementation;
- all results monitoring.

**SWOT analysis** involves defining the characteristic factors of the object of research and classifying them into four categories: Strengths, Weaknesses, Opportunities, and Threats. They should be further assessed and ranked based on their weight (importance). Strengths (S) and Weaknesses (W) are factors of the internal (endogenous) environment, while Opportunities (O) and Threats (T) are factors of the external (exogenous) environment of the object under study [11, 12].

SWOT analysis can be used to build organizational or personal strategy. Steps necessary to execute strategy-oriented analysis involve identification of internal and external factors (using the popular 2×2 matrix presented in figure 2), selection and evaluation of the most important factors, and identification of relations existing between internal and external features.

![Figure 2. A SWOT analysis 2×2 matrix for evaluating strategic parameters of human capital development in the agrarian sector [13].](image)

This method has become quite widespread and is used in various fields of science. Its universality is explained by the fact that it allows considering and analyzing the factors that are rather difficult or even impossible to be formalized in quantitative terms. For example, significant factors for analyzing the human capital of the agrarian sector include the quality of education, the quality of health services,
etc.

Internal factors may include personnel, finance, manufacturing capabilities, etc. They can be viewed as strengths or weaknesses depending upon their effect on the organization’s objectives. External factors include macromarketing, legislation, technological changes and sociocultural changes, as well as changes in the marketplace. Results are often presented in the form of a matrix.

The use of a SWOT analysis matrix makes it possible to elaborate a strategy for human capital development in the agrarian sector. The basis of this strategy consists of the identified strengths. Driven by the opportunities provided by the external environment, they allow minimizing threats and eliminating weaknesses in human capital development.

The algorithm for constructing this matrix is, on the one hand, a universal tool, since it involves the selection of parameters inherent in different levels of human capital pooling (national, regional or sectoral). On the other hand, the set of characteristics being considered and analyzed is strictly individual, which ultimately allows developing a strategy for human capital development in the agrarian sector both for the country as a whole and for a specific territorial entity (taking into account its regional and local peculiarities).

SNW analysis is an improved version of SWOT analysis and involves analyzing the strong (Strength), neutral (Neutral) and weak (Weakness) sides of the object under study [14]. This method involves dividing the significant internal environment factors into separate blocks and parts, highlighting the advantages, disadvantages and neutral positions, and identifying the opportunities and risks within each of them [15]. The fundamental difference of this method is that an intermediate Neutral category is added to the analysis of threats and opportunities, with the help of which it is possible to position the investigated factor as “market average” [16, 17]. With this feature, in the conditions of limited resources, it is possible to focus on achieving competitive advantages where it is really necessary in the current economic environment.

The application of SNW analysis implies creating a matrix as it is presented in figure 3.

| Factors | Evaluation |
|---------|------------|
|         | Strength (S) | Neutral (N) | Weakness (W) |
| Factor 1 |             |             |              |
| Factor 2 |             |             |              |
| Factor 3 |             |             |              |
| ...     |             |             |              |

Figure 3. A stylized example of a SNW analysis matrix for evaluating strategic parameters of human capital development in the agrarian sector [18].

It should be noted that it is advisable to conduct an SNW analysis of human capital development in the agrarian sector on a regular basis, as the development strategy is being implemented. This will solve two problems:

- search for strong positions and their growth in the future using them as a resource;
- reduction, neutralization, analysis and elimination of weaknesses, minimization of their impact [15].

The final results of using this method can be considered the following:

- advantages remain in force, as well as strengths;
- neutral segments are fixed or improved;
- weaknesses are eliminated or minimized, or ideally turned into advantages [15].

In the process of SNW analysis of human capital in the agrarian sector it is possible to study the following factors that predetermine its development: presence/absence of strategy; legal and regulatory framework; economic potential; development of international migration; dependence of the labor market on international migration; development of shuttle migration; socio-economic climate of the territorial entity; rural development; quality of health care; quality of education; development of
agricultural sectors; profitability of agricultural sectors; investments and their availability; innovative attractiveness of the territorial entity; quality of life of the rural population, etc.

The objective necessity of using this method as a supplement to SWOT in the analysis of human capital in the agrarian sector is conditioned by the fact that the actual level of development of any aspect (parameter) of human capital in the agrarian sector will correspond to some average values and at that moment cannot be attributed to either clearly positive or clearly negative sides. It would also be inappropriate to focus on it in the process of formalizing the current version of the strategy. As a result, this method allows “simplifying” the object of research to a certain extent by making a clear distinction between the target elements of the strategy according to the relevance (priority) of their achievement (accomplishment).

The data obtained at the stage of strategic analysis makes it possible to develop a number of alternative strategies for human capital development in the agrarian sector, targeting one goal. The portfolio of effective strategies formed at this stage allows solving problems within the framework of the designated goal in various ways. The stage of strategic alternatives ends up with the choice of one of the developed strategies, which can provide maximum efficiency in the long term.

Due to the peculiarities of human capital, namely the key dependence of human capital development in the agrarian sector on quantitative reproduction of the rural population, a special place in the strategic planning of human capital development is occupied by demographic forecast, which is an assessment of the main strategic parameters of population development, e.g. number, age and sex composition, fertility and mortality, and migration.

Assessment of prospective parameters of population size and structure serves as the basis for determining the need for jobs, educational institutions, doctors, housing, products, etc. Results of such forecast are further used by public authorities when determining the need for allocating the required amount of funding for the development and placement of social and engineering infrastructure facilities within certain territorial entities.

Demographic forecasting uses the following methods: exponential function method, classification by birth year (cohort component method), anamnestic method, the Pearl-Reed logistic curve, analytical alignment of time series, extrapolation by average absolute population growth, extrapolation by average growth rate, and extrapolation by average annual growth rates [5, 10, 19-22].

Studying the migration processes, as well as migration flows forecasting in modern Russian conditions constitute a key element of state policy targeted at activating demographic processes in the country and satisfying the increasing demand of the national economy for labor resources. The agrarian sector is no exception in this case. Due to the peculiarities of agrarian production (primarily a significant amount of manual labor and at the same time relatively low wages and unpopularity of rural labor among young people) the immigration of employable population is one of the simplest and at the same time efficient tools for realizing the economic potential of the agri-food sphere.

At present the economic literature has accumulated extensively studied tools for analyzing migration processes [10]. Depending on the availability of initial information, two groups of methods for analyzing migration movements are distinguished:

- direct methods are used for direct recording of migration events and are based on the latest information about registered migration flows;
- indirect methods imply calculations and are used to analyze illegal immigration, seasonal migration and commuting (shuttle migration). The main indirect methods are component analysis, balance method, life table method, and biographical method.

In recent years it has been proved in the economic literature that economic and mathematical modeling (EMM) is the most effective method for justifying the optimal parameters of functioning of enterprises, taking into account the use of scenario approach. These methods together with the use of personal computers and a set of software provide significant advantages over other methods and techniques [5, 23-25].

The main goal of the above methodology for forming a strategy for human capital development in the agrarian sector is to ensure the possibility of monitoring, control and objective planning of
strategic parameters of its spatial and dynamic development at various levels (e.g. country, regional entities, and municipalities). The developed methodology can become a rather effective tool for public authorities in strategic planning and management of socio-economic development of individual territorial entities. Its use makes it possible to develop strategy elements based on the objective analysis of existing trends and prospects for the development of individual elements of the human capital system, while taking into account competitive opportunities and contributing to the realization of the potential of each of them.

From the perspective of problem-based approach, the formation of a strategy for human capital development in the agrarian sector has a number of peculiarities due to the complex socio-economic essence of the research object. These peculiarities include:

- high flexibility of strategies for human capital development, depending on the specific socio-economic characteristics of the territorial entity;
- duality of goals for the implementation of development strategy, which consist in increasing the human potential and increasing the efficiency of human capital use. This duality of goals is based on the fact that formation and use are largely interdependent. On the one hand, the formed qualitative and quantitative level of human capital determines the current efficiency of functioning and the prospects for the development of both the economy as a whole and its individual sectors. On the other hand, the development of production and non-production spheres impose requirements on the development of human capital, encouraging all parties involved in its formation to adapt to the changing production requirements;
- critical importance of accurate strategic planning, due to the significant duration of the period of human capital formation, as well as low economic mobility in agricultural sectors caused by a long production cycle and immobility of the main means of production (i.e. the land);
- specificity of functioning of the elements that form the system of reproduction of human capital. It redefines a special approach to the formation of a set of effective alternative strategies;
- consistency of interests of all parties involved in the formation and use of human capital in the agrarian sector, while the development strategy is being elaborated;
- formation of a strategy for human capital development presupposes that the existing interdependent strategies for the development of the national socio-economic sphere are aligned into a single system;
- prioritization of implementation of strategy elements is based on the goals of national development in a strategic perspective, supported by the efficiency of use of allocated budget funds.

4. Conclusion
At present solving the problems of human capital development in the agrarian sector is one of priority areas, since the formation of an effective mechanism for human capital development largely determines the development of the agri-food sector and to a certain extent predetermines the vector trajectories of development of the entire national economy.

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