

**Tatyana VIATKINA**

*Lugansk National Agrarian University (Ukraine)*

e-mail: Tviatkina@mail.ru

# Modeling the Assessment of Agricultural Enterprises Headcount Analysis

## ABSTRACT

The modern procedures of enterprises labour resources have been analyzed. The algorithm for calculation the enterprise performance potential efficiency ratio and assessment of the performance potential of the enterprise assessment based on quantitative and qualitative characteristics has been provided. The model for assessment the effectiveness of labour management of enterprise, branch or region subject to such factors as motivation, labour expenses, staff rotation and its qualifications has been proposed. The proposed model covers the assessment of effectiveness of labour management of enterprise, branch or region subject to baselines. Situation where all inequalities are meeting means that this strategy is implementing effectively. If otherwise, the company should take additional measures for to improve indexes specifying deployment of staff, its motivation, turnover, qualifications and labour expenses. Application of the considered provisions and concepts together with applied tools makes it possible to model elements of effective utilization of performance of potential of any agricultural enterprise. The proposed procedure for assessment of agricultural enterprises headcount analysis is applied one and can be used when developing a strategy for adequate assessment, looking for new ways to improve utilization of labour resources in agricultural sector.

**Key words:** *labour resources; model for assessment the enterprise labour resources, effectiveness of labour management, motivation.*

**Introduction.** When regarding the able-bodied population as the resource which is creating a value added owing to which a net profit is generating, the permissible limits for utilizing this resource should be well defined. As opposed to any other types of resources, the enterprise personnel has an option either to create value added on the existing workplace, or to look for any better conditions which, to a large extent, depend on strategic and operative decision of the company's management team.

The strategy for resource management paradigm contemplates availability of the model of effective operation of enterprises within the context of dynamic space. Fulfilment of the conditions specified in each individual case by the defined model, allows creating the expected result and the foreseeable situations which are specific for the certain period. Among all categories of resources the labour resources are suffering the largest changes both within and without. Demographic, political and social situations can act as factors of external changes. Level of business culture, terms of remuneration and other motivational mechanisms are falling into the category of internal changes, in other words to those changes that the enterprise itself is initiating. Up to the present moment there are a number of open questions concerning assessment of the enterprise headcount analysis that would promote a deeper study of negative trends causes and to setting effective strategies management of performance potential in agriculture.

Goal of this research is analysis of existing and formation of author's mathematical models for assessment efficiency of utilization of performance potential of agricultural enterprises.

Review of recent researches and papers. The key domestic agrarian scientists, such as Berezin

A.V. (Berezin, Plotnik, 2012), Goncharov V. N. (Goncharov, Kolesnikova, 2012), Mesel'-Veselyak V.Ya. (Lupenok, 2012) Sabluk P.T. (Vitvitsky, Gudzinsky, Ishchenko, 2002), (Sabluk, 2003), Tkachenko V. G. (Tkachenko, 2009) and others, are focusing on research the special features of the process of the state of domestic agro-industrial complex, formation and utilization in it of such important element of resource potential as a labour one. The scientists acknowledge the situation on development agricultural areas where formation of labour resources in agrarian sphere takes place to be rather critical. Speaking from the perspective of farm workers, this sector is unpromising one because of lack of steady income in the sector and low wages. Studies of such foreign scientists as Armstrong M. (Armstrong, 2002), Jones P. (Jones, 2008), Maxwell L. (Maxwell, 2009) and others are making a theoretical basis for studying components of the stuff management process.

**Presentation of the body of text.** Changes in occupational pattern of population of such category as labour resources of Ukraine are of dynamic nature. The causes of these changes are: labour recourses increase; redistribution of employees of enterprises of different forms of ownership for private sector of economy; reorientation of occupational pattern from sectors of real economy to services sector; reduction in the number of workers and increase the number of working-age persons who are on off-job training and the persons engaged in private plot activities, i.e. those who are not engaged in economy; reduction in the number of works in productive industry and increase the number of part-time workers; intensive growth of inefficient employment; increase in dismissed employees from enterprises and organizations in comparison with employees on the payroll; reduction in possibilities for expansion of secondary employment and improvement in employment in informal economy (shadow economy); deterioration of professional skills of occupational pattern of population.

Assessment of labour resources of the enterprise is carrying out based on current practices and works of domestic and foreign scientists. So, L.Nizova, the representative of the Russian school of thought, recommend the following approach to assessment of performance potential of the enterprise (Novikova, 2010):

$$\Phi_T = \Phi_K - T_{HP} \quad (1)$$

Where

$\Phi_T$  — is the performance potential of the enterprise,

$\Phi_K$  — is calendar fund of time, hours.

Or

$$\Phi_{\Pi} = \mathcal{U}_{\Pi} \times \mathcal{D} \times T_{CM} \quad (2)$$

Where

$\mathcal{U}_{\Pi}$  is the number of people employed;

$\mathcal{D}$  is a number of working days in the period, days;

$T_{CM}$  is a labour day duration, in hours.

The domestic scientist T.Oliylyk suggests defining the performance potential reproduction efficiency index ( $T_{\text{эф.воспр.ПП}}$ ) (Oliylyk, 2008, p.29):

$$T_{\text{эф.воспр.ПП}} = I_{\text{ЧПП}} \times I_{\text{ППф.сост}} \quad (3)$$

where  $I_{\text{ЧПП}}$  is the index of mid-annual number of workers;

$I_{\text{ППф.сост}}$  – value index of labour efficiency of actual structure.

However, in our opinion, such approach is not an ideal one as it failed to display index characteristics of the enterprise performance potential reproduction to the fullest extent.

Such authors as V. Grinjev, M. Novikova, V. Samojlenko, V. Smolyuk, M. Bril are considering the algorithm for calculation the index of the enterprise performance potential utilization and are recommending the following procedure (Grineva, Novikova, Samoylenko, Smolyuk, 2009, p.129-132):

1. Justification the index-characteristic system which are in qualitative and in quantitative terms describe development of the performance potential of the enterprise:

$X = (x_j)$ ,  $i = \overline{1, m}$ ,  $j = \overline{1, n}$ ,  $i$  is a characteristic in  $j$ - period.

2. Formation of reference levels of indicator values in the system by min-max criterion.

3. Standardization of indexes in the master system.

4. Calculation of integrated index – a taxonomic development index.

5. Calculation of integrated indexes of performance potential development in dynamics.

Besides that, for the enterprise performance potential assessment the said authors suggest to use indexes represented on Fig. 1.

The scientific approach of Novikova N. N. is rather interesting, unlike any of the other it takes into consideration the weighted coefficients of constituting elements of the performance potential, and is the most acceptable for calculation the full assessment of performance potential the enterprise (Novikova, 2010, p.18):

$$TPI_{kIT}^t = V_1 \times \sum_{i=1}^n TPI_{\Pi p.i}^t + V_2 \times \sum_{j=1}^m YP_j^t \quad (4)$$

Where:

$TPI_{kIT}^t$  – performance potential of  $k$ -enterprise in  $t$  period;

$TPI_{kIT}^t$  – performance potential of  $k$ -enterprise in  $t$  period consisting of collection of  $j$ -indexes,  $j = \overline{1, \dots, n}$ ;

$YP_j^t$  – conditions for realization of performance potential of workers of  $k$ -enterprise in the  $t$  period consisting of collection  $j$ - indexes  $j = \overline{1, \dots, m}$ ;

$V_1, V_2$  – weight of a specific component of performance potential of the enterprise;

$k$  – specific enterprise  $k = \overline{1, \dots, p}$ ;

$t$  – specific calculation period.

## Quantitative indexes

**Number of personnel**

**Age composition and structure of the personnel**

**Qualification structure and staff composition**

**Index of labour productivity:**

- labour productivity;
- profit per one worker;
- share of cost of labour in prime cost, – labour-consuming in product;
- capital equipment per unit of labour.

**Working time utilization indicators:**

- actual hours worked;
- maximum possible labour time reserve;
- absence, demurrage;
- average number of working hours per one worker.

**Index of labour movement:**

- hire turnover rate;
- withdrawal turnover rate;
- separation ratio;
- total turnover ratio.

## Qualitative indexes

### Physical potential:

**Qualifying potential:**  
*education, professional training, operational experience, qualification, occupational skills and competence, labour activity, labour mobility, academic qualification.*

**Cultural and moral potential:**  
*moral bearings, general personal culture, social norms, organizational culture of enterprise.*

**Social and psychological potential:**  
*Activity, vitality, sociability, discipline, social maturity level, level of consciousness and responsibility, enterprising.*

**Intellectual capacity:**  
*Cognitive power, analytical thinking, sound decision making ability.*

**Innovative capacity:**  
*Creative abilities, self-actualization need and ability, initiative, advanced information perceptual ability, ability to extend professional knowledge, ability to set forth new competitive ideas, ability to settle unconventional problems.*

**Fig. 1 Assessment of performance potential of the enterprise based on quantitative and qualitative indicators**  
*Source: compiled on the basis of (Grineva, 2009, p.101, 119-128).*

There are certain special features in utilization labour resources in agriculture which are depending on specific nature of agrarian sector. First of all, they are associated with production methods and conditions of production, technological infrastructure and economic necessity for employees of agricultural enterprises to keep personal farm household. For this reason these particulars are of different origin which modifies impact on type of employment in agricultural industry, and define its labour needs (Berezin, 2012, p.83).

During 2002-2013 in Ukraine there was a rural depopulation trend both in absolute and in relative terms. So, in 2002 rural population made 15,950 million men, and its share made

33,1 % of the total number. In 2012 rural population sank to 14,328 million men, and its share — up to 31,5 %, in 2013 — to 14,174 million men and to 31,1 % respectively (Lupenok, 2012, p.13). Since 2000 the number of employees in the sector sank from 2,5 million to 665 thousand. The payroll rate in agriculture sector is 40 % below the average rate in national economy. 16,8 % of farm households are below the poverty line, in 48,8 % of farm households the overall costs failed to exceed the minimum cost of living.

According to the data specified in the Table 1, there is a stable rural depopulation.

**Table 1**  
**Rural population in Ukraine, thousands of people**

Indicator	Years						
	2002	2008	2009	2010	2011	2012	2013
<b>Population at large</b>	48240,9	46192,3	45963,4	45782,6	45598,2	45453,3	45553,0
<b>Rural population</b>	15950,2	14779,2	14631,8	14513,4	14412,2	14328	14174,4
<b>Share of rural population, %</b>	33,1	32	31,8	31,7	31,6	31,5	31,1

*Source: compiled by author [12]*

But the demographic situation is the partial impact factor; the other factor, economic status, is equally important. Low level of labour expenses, insufficient development of rural infrastructure and low motivation are making basis of its components. As a result of it, there is a migration of rural population to the cities in search of fair wage.

Those elements which influence on long-term activity of the enterprise is the highest should be referred to the primary factors forming the future strategy of personal management on enterprises of the branch or region. Among these factors there are motivation, remuneration of labour, staff rotation and its qualification. The reason for this assumption is that in the course of interviewing employees of agricultural enterprises refer to particular these elements. They can be written down in the form of functional relationships which by means of generalizing

rating index are resulting in comparable stage. Let the function of motivating factor takes the following form:

$$f(M) = \sum_{i=1}^n m_i \quad (5)$$

Where:

$m_i$  — parameters of influence on motivation of employees.

Parameters  $m_i$  can differ subject to specific nature and kind of work of each particular enterprise, sector or regional specialization. As for agriculture, among these parameters are job stability, in other words, confidence that within any extended period there will be a regular job; social benefits — granting of additional preferences in excess of basic payment for labour; support of local infrastructure and career prospects. Despite the fact that for agriculture the last parameter is of lower priority than for trade enterprises and financial sector. Parameters values are determining by expert evaluation methods which are basing on statistical monitoring and empiric studies on the individual basis for each enterprise, sector or economic region. In the process they take values from 0 to 1, where 0 — is total absence of the specified parameter, and 1 — is its maximum efficiency.

The factor payment function takes the following form:

$$f(S) = K_s = \frac{S_u}{S_t} \quad (6)$$

Where:

$S_u$  — the average value of labour expenses for the enterprise, sector or region;

$S_t$  — the average value of labour expenses in the sector if  $S_u$  is the average value of labour expenses for the enterprise; the average value of labour expenses in the sector if  $S_u$  is the average value of labour expenses for the sector; the average value of labour expenses on national level if  $S_u$  is the average value of labour expenses in region.

As relation of labour expenses for enterprise, sector or region in their highest rate exceeds or equal to 0, introduction of rating assessment of the obtained coefficient should make sense. We would like to propose the following rating assessment: if  $1 > K_s > 0$  then  $f(S) = 1$ ,  $K_s > 1$ ,  $f(S) = 2$ . Such system of rating assessment should make sense for is expedient for agricultural enterprises and is founded by the fact that when  $f(S)$  and  $f(M)$  will achieve their maximum values,  $f(M) = 2f(S)$ . This equality is reducing the functional relationship between motivation and labour expenses what is necessary as role of labour expenses in the course of determination necessity to form strategy of stuff management is the priority one. Values taken by  $f(S)$ , have the following economic sense: when  $f(S) = 1$ , the rate of labour expenses in the business entity is below the average in the sector, when  $f(S) = 2$  — the rate of labour expenses is above the average value.

The qualification factor function:

$$f(Q) = \sum_{i=1}^n Iq_i \quad (7)$$

Where:

$Iq$  — the proficiency index of employees of agricultural enterprise.

Proficiency index includes level of special training and occupational experience on similar positions, competence of employee. The term “competence” should include ability of the employee to make professional decisions under dynamic process conditions. Value of each parameter is within the limits from 0 to 1, where 0 — is lack of corresponding parameter, and 1 — is its maximum value.

The necessity for employees to have high qualification is incontestable. In the course of development the effective strategy of business management in broad terms and labour resources in particular, the qualification of the stuff is correlating to the level of performance. Advanced training of employees results in better performance of the enterprise and, as finally, in rise in efficiency of production of business entity.

Assessment of turnover rate of personnel is the essential characteristic for assessment efficiency of labour resources management. As regards qualitative direction, the turnover rate is marked by factors, reasons and motives. Identification of factors is necessary for development particular turnover-reduction measures; motives are baseline for establishing the causes. Reasons for turnover of staff are the most common for the enterprise grounds for dismissal. The principal factors for turnover of staff in agriculture are: low wages in particular groups of workers because of poor job and industrial management, lack of line balance, its seasonal nature; regular overtime hours, work on weekends, discrepancy between carried-out works and skills and primary employment; uncertain prospects of professional advancement, work under arduous and harmful labour conditions; dirty conditions on certain production areas; bad relationship in production collective, with administration; job dissatisfaction. For this reason, as regard agricultural enterprises with seasonal nature of work, no turnover of staff is taking into consideration when assessment of strategy execution efficiency is taking place. For other agrarian enterprises the turnover of stuff function takes the following values:

$$f(P) = K_p = \frac{\sum_{i=1}^n K_{pi}}{n} \quad (8)$$

Where:

$K_{pi}$  — turnover of staff coefficient;

$n$  — number of objects or structural divisions subject to study.

For reduction the functional relationship of turnover of staff to the system of the previous indexes we will use a method of rating assessments. In the context of the enterprise activity, the most efficient strategic management of labour resources (under otherwise equal conditions) takes place when there is no turnover of staff, i.e.  $K_p = 0$ . Under such circumstances  $f(P) = 1$ . Under other conditions we will consider  $f(P) = 0$  as existence of turnover of staff because of dismissal of workers for absence without leave, inconsistent with job, violation of labour discipline, first of all, are related to inefficient strategy of stuff management.

Let's combine the above specified function in the system of inequalities:

$$\begin{cases} f(M) \geq f(S) \\ f(Q) \geq f(C) \\ f(S) \geq f(Q) \\ f(M) \geq f(C) \end{cases} \quad (9)$$

This model demonstrates the assessment of competence of management of labour resources of the enterprise, sector or region subject to core indicators. The situation when all inequalities are performed means that the specified strategy is implementing effectively. Otherwise the enterprise should involve additional measures for improvement indicators representative for stuff utilization, its motivation, turnover, skills and labour expenses.

**Conclusions.** Application of provisions and concepts addressed along with applied tools allows to model elements of effective utilization performance potential of the agricultural enterprise. The proposed procedure of assessment of agricultural enterprises headcount analysis is of applied nature and can be used when developing strategy for adequate assessment, looking for new ways for improvement utilization of labour resources of agro-industrial complex enterprises.

## References

1. Armstrong, M. (2002). *Strategicheskoe upravlenie chelovecheskimi resursami [Strategic management of human resources]*. Moscow: INFRA.
2. Berezin, A., Plotnik, A. (2012). *Ekonomicheskiy potentsial agrarnykh predpriyatiy: mekhanizmy formirovaniya i razvitiya [Economic potential of agricultural enterprises: formation and development]*. Poltava: Inter Grafika.
3. Goncharov, V., Kolesnikova, V. (2012). *Razvitiye upravleniya trudovymi otnosheniyami na predpriyatiyakh: monografiya [Development of labour management relations on enterprises: monograph]*. Lugansk: Izd-vo «Noulidzh».
4. Jones, P. (2008). *Upravlyayte lyud'mi effektivno. Kak obespechit' vysokuyu produktivnost' v rabote, opirayas' na motivatsiyu sotrudnikov [Operate people effectively. How to provide high efficiency in work, relying on motivation of employees]*. Moscow: Delo I Service.
5. Maxwell, L. (2009). *Motivatsiya reshayet vse [The motivation settles everything]*. Moscow: Poppuri.
6. Tkachenko, V. (2009). *Motivatsiya trudovykh resursov sel'skikh territoriy: monografiya [Motivation of labour resources of rural areas: monograph]*. Lugansk: Elton-2, 2009. P. 228.
7. Vitvitsky, V., Gudzinsky, C., Ishchenko, T. (2002). *Naseleniye i trudovyye resursy sela [Population and labour resources of rural areas]*. Kyiv: IAE UAAAN.
8. Nizova, L. *Trudovyye resursy i trudovoy potentsial kak faktor demograficheskogo razvitiya obshchestva [Labour resources and labour potential as a factor of demographic development of society]*. Retrieved from: [labourmarket.ru/conf3/reports/nizova.doc](http://labourmarket.ru/conf3/reports/nizova.doc).
9. Novikova, N. (2010). *Metodologicheskoye obespecheniye sistemy upravleniya trudovym potentsialom promyshlennykh predpriyatiy: avtoref. dis. na soiskaniye nauk. stepeni doktora ekon. nauk: spets. 08.00.04 „Ekonomika i upravleniye predpriyatiyami (po vidam ekonomicheskoy deyatel'nosti)“ [Methodological support of the system of control of performance potential of industrial enterprises: Author's thesis, Doctor of Economics dissertation: special 08.00.04 «Economy and management of enterprises (by types of economic activity)»]*. Kharkov.
10. Oliynyk, T. (2008). *Formirovaniye i effektivnoye ispol'zovaniye trudovogo potentsiala sel'skokhozyaystvennykh predpriyatiy: Monografiya [Formation and effective use of performance potential of agricultural enterprises: Monograph]*. Kharkov: Magda of Ltd.
11. Sabluk, P. (2003). *Stabil'nyye ekonomicheskiye usloviya kak faktor posledovatel'nogo povysheniya effektivnosti sel'skokhozyaystvennogo proizvodstva [Stable economic conditions as a factor of consecutive increase of efficiency of agricultural production]*. *Ekonomika APK*, 1, pp. 12-17.
12. *Statisticheskiye dannyye gosudarstvennoy sluzhby statistiki Ukrainy [Statistical data of the public office for statistics of Ukraine]*. Retrieved from: <http://www.ukrstat.gov.ua/>
13. Lupenok, Y. (Ed.). (2012). *Strategicheskoye napravleniye razvitiya sel'skogo khozyaystva Ukrainy na period do 2020 goda [The strategic directions for development of agriculture of Ukraine for the period up to 2020]*. Kyiv: NNTs "IAE".
14. Grineva, V., Novikova, M., Samoylenko, V., Smolyuk, V. (Eds.). (2009). *Upravleniye razvitiyem trudovogo potentsiala predpriyatiya: monografiya [Management of performance potential development of the enterprise: monograph]*. — Kharkov: Izd. KHNEU.