THE CHANGES OF THE DEMAND AND SUPPLY OF AGRICULTURAL HUMAN RESOURCES IN LITHUANIA

Rūta Adamoniene, Feliksas Klupšas

Summary

The analysis of the state of human resources in Lithuanian country has been discussed in the article. The changes of the demand and supply of Lithuania's human resources have been analysed and prognosticated as well. The demand of agricultural human resources has been prognosticated by using a dynamic line - trend, as well as the prognostication method of the dynamic line's saturation coefficient and the direct normative prognostication method. The prognoses of the change of the supply of agricultural human resources have been determined by using the method of dynamic lines and the method of direct prognostication.

The tendencies of the demand and supply changes of agricultural human resources are concisely presented in the conclusions.

Santrauka

Tyrimų tikslas – nustatyti Lietuvos žemės ūkio žmogiškųjų išteklių paklausos ir pasiūlos pokyčius. Kaip rodo atlikti tyrimai, diegiant intensyvias ūkininkavimo ir žemės ūkio produkcijos gamybos technologijas, mažėja nekvalifikuoto darbo vietų skaičius, kuris dabar yra vyraujantis šalies žemės ūkio sektoriuje, iš kitos pusės, atsiranda naujai kvalifikuotų ir pažangias technologijas įsisavinusių darbuotojų poreikis. Pakankamai išsilavinusi ir kvalifikuota darbo jėga žemės ūkyje, padidėję jos gebėjimai atitikti rinkos ekonomikos keliamus reikalavimus lemia visos šalies plėtros tempus. Straipsnyje aptarta Lietuvos kaimo žmogiškųjų išteklių būklės analizė, analizuoti ir prognozuoti šalies žemės ūkio žmogiškųjų išteklių poreikio ir pasiūlos pokyčiai. Nustatyta, kad Lietuvoje žemės ūkio produkcijos gamyboje dirba daugiau darbuotojų, nei to reikalauja ekonominis ir technologinis tikslingumas Žemės ūkio žmogiškųjų išteklių poreikis prognozuotas panaudojus dinaminės eilutės – trendo, prisotinimo koeficiento dinaminės eilutės ir tiesioginio normatyvinio prognozavimo metodus. Nustatyta, kad patikimiausi yra dinaminės eilutės – trendo ir prisotinimo koeficiento dinaminė eilutės žmogiškųjų išteklių poreikio prognozavimo metodai. Tiesioginio normatyvinio prognozavimo metodas iš esmės turėtų būti pats tiksliausias, nes operuojama konkrečiais apimties duomenimis, konkrečiais darbo imlumo normatyvais (sąlyginiu žmonių skaičiumi 1000 t produkcijai pagaminti). Tačiau didelėje sistemoje egzistuoja ir didelė tikimybė, kad "nesvarbi" produkcija liks neįvertinta.

Žemės ūkio žmogiškųjų išteklių pasiūlos kitimo prognozės nustatytos panaudojus dinaminių eilučių ir tiesioginio prognozavimo metodus.

Išvadose glaustai pateikiamos tyrimais nustatytos žemės ūkio žmogiškųjų išteklių poreikio ir paklausos kitimo tendencijos.

Key words:

agriculture, human resources, supply, demand, prognostication, prognostication methods.

Raktiniai žodžiai:

žemės ūkis, žmogiškieji ištekliai, pasiūla, paklausa, prognozavimas, prognozavimo metodai.

Introduction

During the integration process of Lithuania into the European Union, one of the main priorities is the integration into the common market, which includes the free moving of goods, services, capital and work power. The development of human resources is the complex part of this process, diminishing differences existing between states and regions and which could not be abstracted from investments into business development and infrastructure. The extent, composition and dynamics of human resources allow to judge about social-economical state of the whole country, its tendencies and dictates necessary measures that should be taken by the State in order to neutralize negative and consolidate positive tendencies of its development. One of these processes is the employment of citizens, its change and tendencies. The main problem in this sphere is unemployment. Even with the supply and demand balance of human resources, the natural reproduction is going on, professional mobility characteristic to them as well as structural changes.

According to the carried out researches, while implementing intense technologies of farming and agricultural production, the number of the places of unqualified work are decreasing. This number has dominion over agricultural sector of the country, on the other hand, the demand for newly qualified and progressive technologies mastering workers, appears. Sufficiently educated and qualified working power in agriculture, increased abilities to meet the raised requirements for market economy influence the rates of the development of the whole country. The complex situation in Lithuanian country enables us to pay a special attention towards the problem of the co-ordination of the supply and demand of agricultural human resources.

Objectives and Methodology

The aim of the research is to determine the changes of the demand and supply of Lithuanian agricultural human resources.

The object of researches - Lithuanian agricultural human resources.

Research methods - the prognostication of the supply of the country's agricultural human resources has been carried out using the method of dynamic lines and the method of direct prognostication. The prognosis of the demand of human resources is grounded while using the dynamic line (trend) method as well as the method of the saturation coefficient's dynamic line and the method of the direct normative prognostication. According the carried out researches it has been determined that the most reliable methods are the first two demand calculation methods. The third method, in the main, should be the most precise one, because the data of a particular volume and particular normatives of labour receptivity are being focused on. However, a big probability exists in this big system that "unimportant" production would be unpriced. Although the dynamics of labour receptivity normatives is grounded logically, in reality, it has many declinations.

The researches have been carried out meeting the requirements of representativity, reliability, objectivity and ethics.

The state of human resources in Lithuanian country

According to the data for Population and Housing Census in 2001 3475,6 thousand people have been living in Lithuania, 1149,4 thousand of them have been living in rural vicinities and they made up 33,1 per cent of all country's inhabitants (Gyventojai,2000). Unfavourable demographic situation was at that time in the country. Negative natural increment of population has been fixed. Although the natural increment of population in the country is negative, the positive mechanical increment of population has been fixed during last years. The structure of inhabitant's age in the country and town differ. For 1000 thousand able-bodied population in the country fall 1,6 times more 60 year old (and older) persons,

however, during the last years the able-bodied population in the country has increased (Demografinė, 2002). Agriculture remains the main activity in the country. 51 per cent of those employed in the country are occupied with agriculture (together with hunting, forestry and fishery). About 35 per cent of those occupied with agriculture usually work in service sphere (wholesale and retail trade, repairs, transport, communication, government of state and financial mediation), the rest ones - in building and industry. In particular regions from 52 to 82 per cent of all employed in the country are occupied with agricultural activities. It shows the lower level of technical progress and relatively great importance of agricultural sector in the economics of separate regions of Lithuania. Most of the employed in the agricultural sector are employed in dairy and milk production and crop growing and only some are employed in poultry and crops growing as well as in untraditional agriculture.

Today Lithuania's agriculture remains the traditional activity, the fourth, according to the specific weight in the extent of gross home output. Those employed in the agricultural sector make up 17 per cent of Lithuania's employed inhabitants. While carrying out the land reform, many small farms appeared, which are not strong enough to ensure the effective employment for the farmer and his family. 36 per cent of Lithuania's unemployed are from rural vicinities, the activity level of labour power is 52,5 per cent, employment level is 44,9 per cent. There is vivid excess employment in the country's agriculture. Besides, the part of employed in the agricultural sector are part-time farmers (Žemės ūkis, 2002).

The part of Lithuanian inhabitants, employed in agricultural and forestry sectors, in comparison with the members of the European Union (EU) and the countries members into EU is a large one (17,1%). The number of employed in the sector of agriculture in the European Union decreases every year. It is connected with the intensity of agriculture and the less demand of the labour power, the development of alternative activity in rural vicinities as well as the better paid work in towns (Europos, 2001). In Lithuania, this process is going on very slowly due to not large variety of rural economical activity, the high level of unemployment in the town, unsufficient knowledge while working uder market conditions and other reasons, which influenced such fact that in the sector of agricultural production work more people than it is expected from economical and technological expediency.

The environment of demand and supply of agricultural labour resources

At present, considerable changes are being noticed in the social life. Informational society is being formed, which is characteristic not only by the achieved level of knowledge, but by the ability and motivation for its renewal as well. Europe is influenced by the spread of informational technologies, which is followed by scientific and technical renewal of the market. Open, full of risk world demands communication and trust from the people (HIV/AIDS,2002, Добрынин, 1999). That's why considerable changes are going on in the sector of agriculture. Relations of production and employment conditions have changed: one must choose between universal orientation and specialization. Agricultural enterprises are seeking for more flexibility and decentralization in their work. Orientation towards the ability of accomodation: to cooperate in the networks of enterprises, to more closely cooperate with providers and buyers. Cooperation is only few consequences for the development of informational technologies. Informational technologies allow to automatize routine works. The pithyness of work grows, i.e. the number of tasks, demanding initiative and flexibility, increases. These changes going on due to informational technologies, influence social and economical processes: individual work is being developed, new services are being rended, work organizing forms, requiring high qualified workers are being put into practice. The globalization of economics changes the streams of goods, capital and services in essence. The differentiated world labour market has been formed. One can confess that not only large, but also small enterprises, even the representatives of free professions use teleportation, while

carrying out works in the countries with low earnings. It allows to increase the competitive ability of the economy and to use world resources more effectively (Rodgers, 1994, Sdhwarze, 1991; Wolgte, 1991). In agriculture it is connected with the increase of competitive level: foreign market is filled with agricultural products and is not interested in letting Lithuanian agricultural products in, on the opposite, it is actively breaking into the Lithuanian market space.

The speeding up scientific technical progress forms new scientific conception, speeds up the production of natural products, orientates it towards marketable activity fields. A new knowledge and novelty production model is being formed, which unifies the specialization of the highest level. New scientific knowledge for agriculture are being applied more frequently (Klupšas, 2000).

The main features of contemporary environment, influencing the demand and supply of determination methods of human resources, could be formed. First, the system of agricultural human resources should be a flexible one, quickly changing, quickly reacting towards the rapidly changing competitive environment, technical novelties, organizational requirements. Second, it is an inert system, characteristic for the lower educational level and having the less technical potential in comparison with the workers from other activity spheres.

With the interaction of these two contradictory circumstances, one could prognosticate that the unstability of agricultural system would be even larger, than, in comparison, with industry. It should be taken into consideration, while prognosticating the changes of the supply and demand of agricultural human resources (Adamoniene, 2002).

The prognoses of the supply and demand of agricultural human resources

Determining the directions and rates of the change of the demand of agricultural human resources, we used in the work a dynamic line - trend, as well as the prognostication method of the saturation coefficient's dynamic line and the direct normative prognostication method. We shall discuss the order of the determination of the demand of agricultural human resources using the saturation coefficient. The saturation coefficient shows, how many agricultural workers fall on 1000 inhabitants. It could be calculated for 100 ha of farming lands or for particular production types, such as cereal crops, the number of kept cows, etc.. Choosing possibilities are very large here. The saturation coefficient is determined as statistical quantity according to the data for several past years. Having corrected the coefficient according to expected technological, organizational changes, it is used for calculations. The saturation coefficient is expressed by a following formula:

$$Kd = N\,ž/Ngk, \qquad (1)$$

where: *Kd* - the saturation coefficient; *Nž* - the number of workers needful for agriculture;

Ngk - the number of inhabitants in the country.

Knowing the saturation coefficients of several past years, the trend of the saturation coefficient is being calculated and its meanings for the perspective are being prognosticated. Multiplying the meanings of the saturation coefficient by the number of able-bodied inhabitants in the country, the needful number of agricultural workers is being calculated. This method is the main one, while determining the common need for a longer period of time on the state level and on the level of separate branches. Its quality is the simplicity of the calculation. The main difficulty, while reasoning the method of saturation coefficient, is the foresight of its actual size for the perspective. Lately, the limits of the adjustment of the saturation method are being tried to broaden. Its originated modification was called *the method of relative lever.*

Having multiplied the prognosticated in 2004 meaning of the saturation coefficient (0,219) by the supposed number of inhabitants in the country that year (1187 thousand), we got the prognosticated number of agricultural workers in 2004, i.e. 259,9 thousand workers.

Prognosticating the changing tentencies of the number of agricultural workers, we determined the demand of agricultural workers for 2004 (242 thousand workers) by the method of direct prognostication.

Normative methods are a rather heterogeneous group of methods. The demand for working people could be calculated by the direct way, basing on the size of planned production and output's rates. For example, in order to calculate the demand of specialists for a particular theory, the following normative documents are necessary: qualification requirements for specialists, standard lists of offices and so on. In order to calculate the number of workers, it is necessary to know volume of labour receptivity normatives of separate works. Dividing the total labour receptivity by the effective labour time fund of one worker, the total demand for workers is being calculated.

This method is, undoubtedly, the exact one, however, it demands very much expenditure of labour. It could be applied succesfully in separate agricultural enterprises, but the problem of district (on a Republic's scale) is much more complex. The main durations of this method are as follows: the insufficiency of information, the necessity to constantly revise the whole normative system, the methodical reasoning of the very methods. Very often this method is being treated as the change of the method of saturation coefficient. Here enterprises are being grouped and an optimal standard list of offices is being made for every group. Multiplying it by the number of enterprises in the group, we receive the needful number of workers and structure. It is a progressive method, however, it requires particular stability from a system and a very large analytical work. Applying the method of the direct normative calculation/prognostication for the determination of the demand of human resources, formula 2 is being used:

$$N \check{z} = \Sigma\left(n_1 x t_i\right) / F_{ef}, \qquad (2)$$

where m - assortment of production; n_i - the number of i-s product; t_i - labour consuming content of i-s product; F_{ef} - the effective fund of labour time.

According to the prognosis of Lithuania's agricultural development and the normatives of the labour resources receptivity for agricultural production for thousands conditional workers / for a particular type of production of thousand tones, we have calculated the demand for human resources in agriculture in 2004, i.e. 138,4 thousand workers. Results received, while prognosticating (by this prognostication method) the demand of agricultural human resources, do not correspond to the reality. The normative prognostication method side by side its qualities has many durations. The main is - a particular quantity of production always remains unpriced. In addition, technologies of agricultural production have a very wide spectrum in Lithuania - from very archaic to the modern ones.

Summing up the carried out calculations, one can note that the results received by the direct programming way and by the method of saturation coefficient, are alike. It is prognosticated that the number of those employed in agriculture will decrease in 2004 up to 259-242 thousand.

According to the data of Lithuanian agrarian economical institute, the number of employed people in the traditional activity of agriculture during 2002-2006 will decrease by 35 thousand. One part of them, i.e. 2,8 thousand will be occupied with untraditional agriculture, 2,3 thousand will be employed in agricultural production not for food purposes 1,0 thousand will be employed in the works of the improvement of forest infrastructure and planting of greenery and 6,3 thousand will be employed in alternative trades.

Determining the directions and rates for the demand of agricultural human resources, the methods of dynamic lines and direct prognostication have been used in our work. The aim of the dynamic line's direct prognostication is the prognosis of the number of rural inhabitants, because more than half of rural inhabitants are employed in agricultural sector. According to the statistical data 1179,5 thousand inhabitants lived in rural areas in 1990. Till 1994 this number increased and in 1994 there were 1190,6 thousand inhabitants in rural vicinities (Lietuvos <...>, 2001). Later this number decreased at full speed and in 2000, 1176,3 thousand inhabitants lived in the country. A formula of theoretical (prognosis) curve is the following one: $y_T = 0{,}0758t^3 - 1{,}7469t^2 + 10{,}759t + 1168{,}1$, [$\mu_{aprok}$=0,14%]. It is prognosticated that the number of inhabitants in the country till 2004 will increase and 1184,33 thousand people will live in the country.

Prognosticating the supply of human resources according to the dynamic lines of separate factors, one should know the supply of human resources in the beginning of the period, as well as to foresee, how it would be influenced by the number of births, death-rate and migration. Since 2001 the number of births in the country decreases (10,3 of a newborn was born for 1 thousand inhabitants that year). It is prognosticated that in 2004, 9,4 of a newborn would fall on 1 thousand inhabitants. The change curve is $y_T = -0{,}003t^3 + 0{,}0952t^2 - 1{,}3211t + 17{,}953$, [$\mu_{aprok}$=2,17%].

The death-rate in the country changed according to the curve $Y_T = 0{,}0087t^3 - 0{,}2247t^2 + 1{,}4544t + 14{,}358$, [$\mu_{aprok}$=1,07%]. The highest death-rate in the country was in 1994 and reached 17,5 of a person for 1 thousand inhabitants. Since 1994 the death-rate decreased. It is prognosticated that in 2004 it would rise and would make 14,6 persons for 1 thousand inhabitants.

Migration inside Lithuania (between the country and town) decreases, but the number of those constantly migrating from towns to the country the higher than vice versa. Due to this factor, the number of inhabitants in the country should increase. *Immigration*: the largest number of inhabitants came to live in the country in 1990 (36 persons for 1 thousand inhabitants). Later the number of those coming to the country decreased. The excitement was only in 1996 (30,3 persons for 1 thousand inhabitants). Later this number decreased again and in 2000, 18,5 of the newcomers fell on 1 thousand rural inhabitants). This rate changed according to the curve $y_T = 0{,}0092t^3 - 0{,}2755t^2 + 2{,}65221t + 45{,}237$ [μ_{aprok}=3,81%].

According to the prognosis curve, 13,9 persons for 1 thousand inhabitants will come to the country in 2004. Immigration: 37 persons (for 1 thousand inhabitants) have left the country. Later this number decreased very rapidly (the curve $y_T = -8{,}1007 \cdot \ln(t) + 36{,}753$, [$\mu_{aprok}$=7,9%] and in 1994, 21,7 persons have left the country. In 2000 this number decreased up to 15,5. It is prognosticated that the number of those leaving the country will continue to decrease and in 2004 it will reach 15,4 persons for 1 thousand inhabitants.

Discussion

The extent, composition and dynamics of human resources allow to judge about social-economical state of the whole country, its tendencies and dictates necessary measures that should be taken by the State in order to neutralize negative and consolidate positive tendencies of its development.

For the prognostication of the demand of human resources the most reliable are the method of a dynamic line - trend and the prognostication method of the saturation coefficient's dynamic line.

For the prognostication of the supply of human resources the most reliable are the method of a dynamic lines and direct prognostication method.

Conclusions

1. In Lithuania, more workers are employed in the sector of agricultural production, than economical and technological expediency requires.
2. Having looked over the agricultural labour environment of the demand and supply of human resources, one can formulate the main characteristics for contemporary environment influencing the determination methods of the demand and supply of human resources. First, the system of agricultural human resources should be very flexible, rapidly changing, very quickly reacting towards the rapidly changing competitive environment, technical novelties, organizational requirements. Second, it is an inert system, which is distinguished by the lower educational level and the smaller technical potential in comparison with the workers of many other activity spheres.
3. The most reliable is the method of a dynamic line - trend and the prognostication method of the saturation coefficient's dynamic line. The direct normative prognostication method, in essence, should be the most exact one. However, a big probability that "unimportant" production would not be appreciated, exists in a large system.
4. For the prognostication of the supply of human resources, we suggest two following methods: the dynamic lines and direct prognostication, while calculating the number of inhabitants' births, death-rate, migration and evaluating the shifting of inhabitants' age.

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Authors:

Rūta Adamoniene, Feliksas Klupšas
Lithuanian University of Agriculture