EVALUATION OF THE STRUCTURAL POSSIBILITIES AT FARMS IN LITHUANIA BY LINEAR PROGRAMMING

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The farms disparity in size is not exceptional - in many part of the world many different sizes of farms exist next to each other. Theoretically, such tendency is explained by the horizontal part of the long run per unit cost curve above a certain minimum size or by the fact, that actual structure in developing economies is always running behind actual and desired structure, and many smaller farmers stay in business until they retire.

Key words: linear programming, farm size, income rate, revenue, diversification.

Introduction

This paper presents a theoretical outlook on farms of different sizes with the land per man ratio as a central point and highlight possibilities to calculate efficient ranges of outcome from the viewpoint of the farmer by linear programming.

The research problem – to investigate the interaction between the farm size and income rate, depending on farm size and internal revenue.

The research goals:

- to determine the trends for prognostication to farms with the same potential production possibilities and with a direct relation between production and the land area;
- to define optimal solution as a relation between the farm size and earned income rate (gross margin), when the production factors and resources are used in optimum;
- to estimate the optimal result in farm’s production capacity, when the resource limit exits and depends on the results of LP problem solution, when farmer maximizes TNR of production activities and minimizes TC reaching the optimal income rate from affected production capacity depending on relation between production factors and farm size.

The research objective – farms of different business specialization upon different size in Lithuania.

Results

Representation of farms in different structural position in Lithuania is analysed according to J. H. van Niejenhuis (Niejenhuis, 1981). The economic results of farms depends to production plan, which is focused for diversification, when farmers get higher income quicker because of more difference between revenue and total costs. The increase of income ratio could be reached either by using new progressive agro technologies, or increasing land area (per man) or workforce. Finally, the farm goal (income) could be increased by extension of production possibilities (Salam, 1996). By the impact of external business environment and internal technologic features farms size is the important determinant in a short run reaching
positive income and efficient outcome ranges comparing with the long run financial results, when difference between revenue and total costs decreases and income rate will fall down.

The proportional structure of the farms production factors: land, labour, capital and materials, – depends on the farm size. Fixed costs (production’s factor – labour) shift depending on the farm size, workforce per land area demand, increase the price of production factors and decrease the level of wages (negative aspect to social requirements) (Hamdy, 1976).

Could be done a conclusion, that in a long run the limit exists when revenue are less or equal to total costs and income level is less or equal to zero. The farms size indirectly affects the optimal output meaning, when the sensitivity of production plan price in long run relates with the structural proportion of production factors. The total costs rate variation depends on farm production plan and potential activities diversification policy.

The transformation of farms structural aspects in Lithuania is presented as cohesion between the structural situation of farms before and after the transformation. The new farms got some old machinery from the former co-operatives and have housing for a limited number of animals. The middle class farms will have a land/man ratio somewhere between the old large farm and the desired situation for a new large farm.

For the nearest future two ways of structural development of the discussed middle class farms are important. First, the intensification of the production plan as prices of crop is fluctuating rapidly, and the use of risk programming will be an appropriate technique to given insight is impossible development in this way. The second way might be a development in the direction of a modern large (family) farm.

Linear programming (LP) application in farms transformation problem solution with result optimization is presented by LP analysis (Sposito, 1975).


LP problem (primary and dual) is focused on the farm level activities, which are operated in two different kinds of production possibilities. The relation between the determinants of farms production possibilities and production capacity (productivity) - income rate and workforce per land area. The farming goal (maximum income) could be increased by the diversification set of farm activities and production possibilities or minimizing input costs which could be realised in several ways: by reducing workforce and production input cost, and improving the efficiency of inputs application. By arranging all the information of the primal and the dual problems in a single array the symmetrical duality of a general linear programming problem can be formulated as follows: the evaluation of optimal TNR and TC rates, according to the farms size (workers/ha), shows the problem solution - optimality of the outcome ranges and usage of resources.
Conclusions

1. Theoretical outlook on farms of different size with the land per man ratio as a central point and highlight possibilities to calculate efficient ranges of outcome from the viewpoint of the farmer by linear programming.

2. Linear programming results show the farming situation due to production activities. The optimal solution can be found as a relation between the farm size and earned income rate (gross margin) when the production factors and resources use optimum is reached.

3. Total costs shift depending on the farms size, and the expanded farms reach their goal (income) quicker than small one. But the level of revenue and variable costs in long run of expanded farms decrease because of progressive management and technology impact, and at the level income rate will be higher than small one.

References


ÚKIJŲ STRUKTŪRINIŲ GALIMYBIŲ VERTINIMAS LIETUVOJE PANAUDOJANT TIESINIS PROGRAMAVIMĄ

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Straipsnyje pateikiamas tiesinio programavimo ir modeliavimo rezultatai, vertinant ūkio dydžio ir gaunamų iplaukų jame esant skirtių įplaukties ūkio diversifikacijos atvejams Lietuvoje. Galimi ūkių struktūrinių pokyčių siejami su diversifikacijos naudingumu ir būsimais teigiamais ekonominius rodiklius. Ūkių transformacija Lietuvoje formuoja sąlygas atsirasti stambesniems ūkiams, o smulkieji ūkininkai užsiima ekstensyvia veikla pagal norą ir amžių.

Raktiniai žodžiai: tiesinis programavimas, ūkio dydis, pajamų norma, iplaukos, diversifikacija.