SIMULATION MODEL TO DETERMINE THE OPTIMAL FARMS SIZE IN NE REGION OF ROMANIA

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Abstract

The paper has the purpose to approach a fundamental problem of the Romanian agriculture, that is the one of the intensive development as a result of a new phase of the vertical cooperation process, as well as to elaborate economical-mathematical models, being this a necessity of a optimum dimension of the agricultural holdings, rationalization of production processes, of specific consumes, of the economy of the labor force and the adaptation of the request of the ago-alimentary products on the requirements of the market. Under these circumstances, the project tries to demonstrate the importance of the optimum dimension of the agricultural holdings and the rationalization of the relationship between them along the economic chain, as a result of the coordination and orientation of the decisions regarding the production attained and its capitalization. In the context of nowadays economic situation in the Nod-East region of Romania, the agricultural holdings need a change of attitude and strategy, in order to obtain a production at European standards, according to the requirements of the market. The analysis of agricultural structures and projection optimal size is a necessity in rural areas of prime importance for the Romanian agriculture, both as a theoretical issue and practical implications of this phenomenon, regarding the current state of agriculture in the NE region and increased plots properties. As a consequence, the resizing of the agricultural holdings, the partnership between the producers, the integration of agricultural production, the rural development, the consumers' constant request for agricultural and food products, the decrease of the deficit of commercial balance for agricultural products, the increase of the population's life standard, the safety of the food, all these are goals that have to be under the continuous attention of the authorities at central and local level.

Key words: optimum dimension of the holdings-farms, economical-mathematical model, rural development

MATERIAL AND METHOD

The methods consist in use mathematical and economical model. The model constructed is a recursive monoperiodic positive model. With it help, the optimization of the structure of production, the farm crop rotation, the level of investments, loans and the level of investments was made within six years.

RESULTS AND DISCUSSIONS

The purpose of the paper is the analysis of the economic and financial results, as well as the optimum sizing at the level of various types of agricultural holdings in the NE region, in the Romanian contemporary agriculture.

The problem of the rational size of the agricultural holding has been for a long time a subject to think about for the agricultural specialists and general economists. In the years 1968-1970 the discussion was on top, when the so called "European structural plans" were presented, belonging to Schiller, Höcherl and Mansholt, and when the Council of the "wise" for the examination of the macroeconomic evolution was so critic regarding the agricultural structure.

Models of the optimization of production factors were elaborated in France, for the SW region of the country, that after were divided into sub-regions. The next studies included 21 regional units, and then 108 more regions.

This issue can find an excellent solution within this paper, by elaborating and applying the following complex solutions: (1) analysis and proposal of a model for the optimization of some technical and economic indicators in the agricultural holdings at the level of the NE region, such as: the size and the physical situation of the static capital of the agricultural holdings; the efficiency of the investments and their recovery; the technical and the competitiveness level of the products; (2) setting a database for the evolution of the technical-economic indicators at the level of the individual holdings in the last years and the tendency for the future; (3) paper for the

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organization of the holdings and of the agricultural production in the future; (4) determination and analysis of the flexibility of the offer and consume rates for the main agricultural and agro-alimentary products; (5) paper for the marketing association of the producers and processors in the NE region.

The rural area belonging to the NE Region from the administrative point of view gathers the characteristics of not less than 463 parishes and 2445 villages in the counties of Bacau, Botosani, Iasi, Neamt, Suceava and Vaslui, where an approximate of 2,171,838 inhabitants live, representing 56.6% from the population of the region.

One can say that evolution of the number of

individual holdings recorded a slight increase, which occurred as a result of legacies to younger families and the fact that older owners (without descendants, or descendants of the city) have leased land to other families younger, in the village and had no land in exchange for products or even food for them daily. Another case is that of families who left rural areas and land temporarily leased to local people in exchange for goods or smaller amounts of money (*table 1*).

The land that belongs to a family are different in the two areas investigated and the total county area's largest & back area as a result of the small number of existing families compared with NE Region.

Table 1

Evolution of the number of individual farms in 2010-2012

Specification	Year	Number of individual farms	Total agricultural	The agricultural area of individual farms	Total arable -ha-	Arable land of individual exploitation	Average agricultural land/ exploitation	Average arable land/ exploitation
NE Region	2010	439.060	2.128.135	1.833.497	1.364.166	1.255.033	4,18	2,86
	2011	438.840	2.130.268	1.832.030	1.365.533	1.256.290	4,17	2,86
	2012	439.280	2.132.400	1.833.864	1.366.900	1.257.548	4,17	2,86
	(+/-) 2012/ 2010	220	4265	367	2734	2515	0,00	0,00

Data processed by statistical information from the NIS-regional statistics

Table 2

Evolution of the total area allocated per household

Specification	Year	Number of family	Agricultural land of individual exploitation	Arable land of individual exploitation	Agricultural land/family	Arable land/family
NE Region	2010	506.491	1.833.497	1.255.033	3,62	2,48
	2011	506.086	1.832.030	1.256.290	3,62	2,48
	2012	506.592	1.833.864	1.257.548	3,62	2,48
	(+/-) 2012/ 2010	101	367	2515	3,62	24,82

Data processed by statistical information from the NIS-regional statistics

In territorial profile, the land fund is reflected in different services structures with characteristics from an area of agricultural productions to another.

In these counties, the large specialized cooperatives appear and coexist with the multi-functional ones. A part of the specialized cooperatives were associated with food companies.

At the same time, it could be interesting to have a look upon the size structure of the holdings in the U.S.A., and for this purpose a lot of research was made by dividing the land in 144 areas, then in 432 sub-regions, using the economic and mathematical methods for the optimizing of the holding and production.

Research was also done upon the factual conditions of increase of economic efficiency of agricultural holdings in the NE region of Romania, taking into account the human effort, the material and financial investment within the field of

agricultural holdings, as well as the main economic indicators (production costs, the gross result, the rate of gross profit etc.) for the agricultural production, in order to elaborate the optimum sizing of agricultural holdings.

The research of the technical and economic phenomena from many points of view, as well as the analysis calculations imply the operation with a range of methods as follows: the monographic method; methods used to study the structure of the phenomena in its elements and the relation of interdependence between them; analyzing methods of the characteristic phenomena of some homogenous units; the method of the statistic grouping; the graphical method; the partial budget method; the method of calculation of the correlations; methods to foresee the evolution of the phenomena; economic and mathematical optimization methods in order to increase the economic efficiency.

The results of the paper will be exploited and disseminated, by specific methods and means, so that they may reach the main beneficiaries – the agricultural holdings, the private producers, the consumers, the field specialists and experts, the authorities, the academic environment or any kind of specialists that are interested in having a production in safe and efficient conditions according to the EU requirements and regulations.

The paper assures especially the promotion of the farms to be settled, whose size can allow the practice of a viable agriculture, sustainable, capable to apply new technologies and leading towards profit and efficiency, and also to their economic and organizational consolidation.(5).

The purpose is to promote the setting up of farms whose size allows the practice of a viable, sustainable agriculture, capable to apply the newest technologies and lead to profit and efficiency and to their economical and organizational consolidation.

As a consequence, the resizing of the agricultural holdings, the partnership between the producers, the integration of agricultural production, the rural development, the consumers' constant request for agricultural and food products, the decrease of the deficit of commercial balance for agricultural products, the increase of the population's life standard, the safety of the food, all these are goals that have to be under the continuous attention of the authorities at central and local level.

The studies underlined that in the NE Region there were some possibilities to increase the agricultural production, without other investments, whose reasonable use will lead to a more complete use of the natural conditions, of all the economic and social means, as well as to the increase of the economic efficiency of agricultural holdings.

The research results will draw the attention upon the importance of the optimum sizing of the agricultural holdings according to its specialization, as well as the need of the reasonable identification of the production in the NE Region. Eventually, a standard model of the holding groups will be made, according to the optimum size, which will allow the promotion and the practice of a technological flow according to the specialization of the holding, as well as the requirements on the market of products. The results can be extended also for other regions having in view the size of holdings and the characteristics of the area regarding the market request as well as the zoning of the production.

The paper will contribute to the development of the information in the field, including the innovation, originality and complexity of the suggested solutions.

Taking into consideration of the subject of the paper - The agro-alimentary integration of the NE Romanian region and the optimization of the size of agricultural holdings as an effect of the adaptation of the agro-alimentary products to the market's request – we mark out that we have to deal with a scientific as well as practical problem and it represents an actual issue for the EU and Romania. This approach wants to integrate the programmer and the papers for a lasting development, where the human is the main character, along with the ecology and the environment, and last but not least a rational exploitation of the resources.

Structure optimization methodology requires a very diverse cultures, from the simple mathematics to economic modeling, a method requiring computer use. This last method should be used only in large programs, covering very large areas and differentiated in terms of productivity, resulting in a series of restrictions or conditions to be included in the structure of economic and mathematical model. In our case, due to a relatively small number of cultures and conditioning restrictions or lower number, we applied the method of multiple variants.

For each mode calculation was made in a number of conventional animals - AC, which is determined by the possibilities of farmers to provide milk production, especially, in compliance with sanitary requirements of the European Union. In essence, the proposed dairy herds appear to be low, but in the following years they will be able to increase the rate at which farmers can be provided by investment modern animal husbandry techniques. In relation to the size of farms, which are differentiated according to the production area is located, have planned a number of conventional animal heads 15-30 (in conventional animal species cattle number equals the number of jelly animals, namely cows milk), and high meadow area planned a number of conventional animals 5-20, depending on the size of those farms.

In the U.S., the most favorable crops, crop structure was designed for both favorability zones differentiated by planned production. In the module 25 ha (*table 3*), cereals occupy 52.6% cumulative share of 12% technical plants and fodder plants of 35.4%. Note that the category was introduced forage plants and feed barley reason why this culture has a distinct position, but is included in group fodder.

In variant maximum productivity is obtained a profit of 12,494 lei, resulting in an average of

about 500 lei per ha / ha and the total profit is positive 2 11 264 lei, of which is 451 lei / ha.

In the module 80 ha (*table 4*) cereals are designed to occupy 65.7%, technical plants 15.86% and 18.44% fodder plants. In this way an area of favorability resulting total profit 46,598 lei and 582 lei / ha. In zone of favorability resulted in

a slightly lower profit of 41 464 lei and 518 lei / ha.

Module with the maximum size set by GEO 108/2001, of 110 ha projected number of 30 conventional animals, namely cows, which requires an area of 17.70 ha forage base, ie 16.09% of total arable land.

Table 3

Designing crop structure - module 25 hectares –

Nr. crt.	Crops	%	Area ha	Profit - V1 lei/ha	Total profit V1 - lei	Profit V2 - lei/ha	Total profit V2 - lei
1	Wheat	20,0	5	634	3,17	880,2	2,901
2	Barley beer	8,0	2	535	1,07	461,5	923
3	Corn	24,6	6,15	724,5	4,455	653,6	4,02
4	Sunflower	8,0	2	804,6	1,609	652,9	1,304
5	Soy	4,0	1	583,5	584	510,1	510
6	Fodder	35,4	8,85	181,5	1,606	181,5	1,606
7	TOTAL	100	25	-	12,494	-	11,264

The remaining area was divided cereal crops - 76.67 ha, which means 69.7% technical plants - 15.63 ha, 14.21% respectively. In this way an area of favorability total profit was 65,093 lei, representing 592 lei / ha and the total profit of favorability in February was 58,024 lei representing 527 lei / ha.

Should be noted that with increasing total area of cereal crops the share module. This was not

accidental, but was determined by a relatively simple logic. Forage crops are strictly determined by the herd queen planned, so appears as a restriction of minimum technical plants in general is characterized by an economy attractive, but requires a strict individual machine systems, such as sugar beet, so I never even caught her in crop structure, although very favorable conditions found throughout the area of NE Region.

Table 4

Designing crop structure - module 80 ha -

Nr. crt.	Crops	%	Area ha	Profit V1 / lei/ha	Total profit V1 - lei	Profit V2 - lei/ha	Total profit - V2 - lei
1	Wheat	24,5	19,60	634	12.426	580,2	11.372
2	Barley beer	13,2	10,56	535	5.650	461,5	4.873
3	Corn	28,0	22,40	724,5	16.229	653,6	14.641
4	Sunflower	12,5	10,00	804,6	8.046	652,9	6.529
5	Soy	3,36	2,69	583,5	1.570	510,1	1.372
6	Fodder	18,44	14,75	181,5	2.677	181,5	2.677
7	TOTAL	100	80,00	-	46.598	-	41.464

CONCLUSIONS

The paper is a new and comprehensive approach to agricultural structures in the context of specific agricultural production, which motivates the development of efficient farms to increase the quantity and quality of production. Potato production strategies involved or have an active role in economic growth may restrict or even overlap with the factors of production structures, analyzes focusing in this direction.

Romania has no resources rich countries, and no top managerial experience to create in a short time all the best agricultural structures. It is therefore necessary rhythms objectives with maximum efficiency and use of available resources.

Dynamics of agrarian structures in NE Region by 2010 and in view of 2013 shows an

extremely slow pace of transformation. Comparative analysis between Romanian potato production strategies and existing in countries with developed agriculture, especially in the European Union reveals serious gaps, embodied in the performance levels of comparable systems.

Large differences between the systems compared, due to agricultural structures and structural changes too slowly in Romania are the disadvantages can be overcome only through effective economic mechanisms applied under a legal framework adapted to the starting level, the stages and objectives established with financial support and social insurance.

We believe that the problem arises to determine that size, that size of farm crop profiled on the field that determines the economic viability of agricultural structures in the market economy. Optimization of medium size agricultural

structures aimed at maximum efficiency use with climatic conditions, economic and social unit that has an activity farm for profitable.

Achieving this goal in preparing the work of optimization requires consideration of a system of criteria and assumptions, the most important being: detailed knowledge of the earth's productive potential, developing a uniform program for all cultures, getting agricultural products to market demand; promoting concentration and specialization of production on farms, irrespective of land ownership and organization.

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