Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 14, Issue 1, 2014
PRINT ISSN 2284-7995, E-ISSN 2285-3952

THE STUDY FOR SUBSTANTIATE OPTIMAL LOCATION FOR A PROCESSING RAPESEED FACTORY IN CALARASI COUNTY

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Abstract

To ensure a high economic efficiency of productive work is necessary to determine the optimal location of the objective investment. Optimal location creates a prerequisite for approaching the maximum level of investment efficiency both in the national economy and the economic agent. The problem of optimal location of the investment objective must be addressed in a broad vision to solve it using: economic criteria, functional criteria - technological, social, plus natural factors. From the research it was found that the future investment objective on the processing rapeseed in bio fuel and edible oil in Calarasi County is conveniently located in the city being Lehliu Station due to the fact that it has the coordinates close to those resulting from the calculation.

Key words**:** *factory, localities, optimal location, quantity supplied, rapeseed*

INTRODUCTION

To ensure a high economic efficiency of productive work is necessary to determine the optimal location of the objective investment. Optimal location creates a prerequisite for approaching the maximum level of investment efficiency both in the national economy and the economic agent. [3,4] In substantiation of optimum location it is necessary to consider both possibilities raw material supply and sales of production obtained.[6] The problem of optimal location of the investment objective must be addressed in a broad vision to solve it using: economic criteria, functional criteria - technological, social, plus natural factors.[5]Among economic criteria on which you can base the optimal location of a target investments include: proximity to the stocks of raw materials in present and in perspective, attracting local resources into the economic, efficient use of labor, thus bringing to fruition surplus labor in the area, reducing transportation costs and production costs, production close to consumption centers.[1,2]
Social criteria that may underlie an objective substantiation optimal investment location refers to economic growth at the county level, mobilizing resources and local resources, combating environmental pollution, attract economic circuit productive workforce unemployed or fellowship employment, improved living standards of the population in the area.
In this context investment objective is conveniently located in an area where they cover the necessary raw materials and labor, and thus reduce production costs due to reduce transportation costs of raw materials[7][8].

MATERIALS AND METHODS

The study was undertaken to determine the optimal location of a processing plant in Calarasi County rapeseed. To substantiate optimal location Steiner-Weber method was used. Under this method it is assumed that the volume of transport costs is proportional to the quantities to be transported and the distances travelled from suppliers to beneficiaries. It is considered that there is no difference between the rate of transport of the feedstock (rapeseed) or finished product

(biodiesel, edible oil,etc.). And the same locality can participate both as a supplier of raw materials and finished products as beneficiary. Optimal placement of rapeseed processing plant can be established based on the minimum amount of travel expenses and raw material.

It is considered n points Pi (i = 1, 2 .... n) from which will carry the quantities C_i of raw material r_i. Minimum function will be

$$Z(\min) = \left(C_{1r_1} + C_{2r_2} + ...C_{nr_n}\right) = \sum_{i=1}^{n} C_i r_i$$

In cartesian coordinates, this relation becomes:

$$\min (x,y) = \sum_{i=1}^{n} C_i \sqrt{(x - x_i)^2 + (y - y_i)^2}$$

in which:

(x, y) = coordinates of the location of the investment objective and must be determined;

(x_i, y_i) = studied localities coordinates needed to establish location of the new investment objective;

C_i = required amount stocked in and out of localities i

n = number of localities.

Based on the above relationship determining the number of tonne-kilometers that must be transported, where it has a transport fare t/km bulk. Since the number of t/km is minimal and transport costs will be minimal. Solution (x,y) is determined based on a recurrence relationship. For this we start from the solution (x0, y0) given by the relations:

$$X^0 = \frac{\sum_{i=1}^{n} C_i x_i}{\sum_{i=1}^{n} C_i}; Y^0 = \frac{\sum_{i=1}^{n} C_i y_i}{\sum C_i}$$

Starting from the original solution is calculated by means of an improved version of the following formula:

$$X^{k+1} = \frac{\sum_{i=1}^{n} \frac{C_i x_i}{\sqrt{(x^k - x_i)^2 + (y^k - y_i)^2}}}{\sum_{i=1}^{n} \frac{C_i}{\sqrt{(x^k - x_i)^2 + (y^k - j_i)^2}}};$$

$$Y^{k+1} = \frac{\sum_{i=1}^{n} \frac{C_i y_i}{\sqrt{(x^k - x_i)^2 + (y^k - y_i)^2}}}{\sum_{i=1}^{n} \frac{C_i}{\sqrt{(x^k - x_i)^2 + (y^k - j_i)^2}}}.$$

For each iteration k is calculate the value function Z (x, y) and the calculation ends when the new function value exceeds the previous or the differences between the two values are sufficiently small and hence completion of a new phase is insignificant.

RESULTS AND DISCUSSIONS

In towards producing a investment objective rapeseed processing in Calarasi County was designed and analyzed several possibilities location taking into account both technical factors, natural factors, social factors and a number of other factors. For establishing the location to consider the Calarasi County fact that part of South Muntenia Region, holding for a share of 14.8% area[10]. Calarasi County has an agricultural area of 424 833 ha and 410 871 ha arable area, the main crops are cereals grains, oil plants for proper grain legumes, fodder plants[9].

Among oil plants grown at the county level include rape. The area planted rape, rape total production and production per hectare achieved in 2011-2013, in Calarasi County are presented in Table 1. Surface cultivated with rapeseed at the Calarasi county in 2011 was 36304 ha, in 2012 fell to 8620ha area due to poor weather conditions, the culture is largely calamity. In 2013 the surface increased to 44884ha, increase of 23.6% as compared to the cultivated area in 2011.

The total production of rapeseed obtained in Calarasi County 2011 was 72935 tons, in 2012 fell to 16982 tonnes, as a result of the calamity suffered by culture, and in 2013 it increased to 129970 tons, increasing by 78.2% as compared production obtained in 2011.

In 2012 the total production of rapeseed was only 23.3% of the production in 2011.

Average yield per hectare decreased from 2009 kg in 2011 to 1970 kg in 2012, the

decrease was 1.9%. In 2013 the average yield per hectare of rapeseed was 2896kg. Average yield per hectare obtained in 2013 was 44.2% higher than in 2011 and 47% of that produced in 2012.

Table 1. Surface, total production, average yield per hectare of Calarasi County in 2011-2013 and their dynamics

Specification	Years			Dynamics (%)		
	2011	2012	2013	2012/ 2011	2013/ 2011	2013/ 2012
Cultivated area (ha)	36304	8620	44884	23,7	123,6	520,6
Total production (tonnes)	72935	16982	129970	23,3	178,2	765,3
Average yield (kg/ha)	2009	1970	2896	98,1	144,2	147,0

Source: General Division of Agriculture, Calarasi County

Of the 50 localities in the county of Calarasi were taken into account within 7, with largest cultivated the surface, total production and have achieved the highest average.
The data relating to the previously named indicators 2011 are shown in Table 2.

Table 2. The first seven localities from Calarasi county, which have the largest area cultivated with rape in 2011

Localities	Cultivated area (ha)	Total production (tonnes)	Average yield (kg / ha)
Belciugatele	549	1,348	2,455
Borcea	3,949	7,321	1,854
Călăraşi	1,003	2,732	2,723
Ciocăneşti	597	1,532	2,566
Dorobanţu	862	1,828	2,121
Dragalina	1,095	2,076	1,896
Dragoş vodă	1,351	4,112	3,044

Source: General Division of Agriculture, Calarasi County

The area planted by the seven localities in 2011 was from 5,500 hectares (localities Belciugatele) to 3,949 hectares (localities Borcea). The total production of rapeseed obtained from first seven localities ranged from 1348 tons (localities Belciugatele) to 7321tone (localities Borcea) and production per hectare recorded ranged from 1,854 kg / ha (localities Borcea) to 3,044 kg / ha (localities Dragos Voda).
In 2012 the first seven localities that rapeseed cultivated, realize indicators are presented in Table 3.

In 2012, the cultivated area of the seven localities shown in the table ranged from 253 hectares (localities Chirnogi) to 1288 hectares (localities Roseţi).
The total production of rapeseed ranged from 526 tons (common Borcea) to 2573 tons (common Roseţi). Average yield per hectare also varied from 1725 kg/ha (common Borcea) to 1998kg / ha (common Roseţi). In 2012 the area was much lower due to climatic conditions that led to the calamity of considerable areas cultivated with rape.

Table 3. The first seven localities from Calarasi county which have the largest area cultivated with rape in 2012

Localities	Cultivated area (ha)	Total production (tonnes)	Yield (kg/ha)
Borcea	305	526	1,725
Budeşti	534	976	1,828
Chirnogi	253	950	3,755
Dorobanţu	663	1,317	1,986
Roseţi	1,288	2,573	1,998
Şoldanu	340	592	1,742
Unirea	778	976	1,254

Source: General Division of Agriculture, Calarasi County

For 2013 the three indicators at the first seven localities are presented in table. 4
The area planted in 2013 by the first seven common at county level was much higher than in the other two years previously analyzed.
This ranged from 1,133 hectares (Dorobanţu Commune) up to 3636 hectares (Budeşti Commune).
The total output produced of rapeseed by the seven localities was from 2,968 tons (Grădiştea Commune) to 10,129 tonnes (Budeşti Commune).
In terms of production per hectare, it was from 2,601 kg/ha (Grădiştea cOMMUNE) to 3,403kg/ha (Dragos Voda Commune).
Given the results of the rapeseed cultivation in the county of Calarasi, took into account the possibility of building a factory for processing into biofuel oilseed rape and edible oil.
For this it is necessary to study more possibilities to meet the economic criteria, social criteria and natural conditions to ensure proper functioning of the technological

process and to determine the maximum economic effect.

Table 4.The first seven localities from Calarasi county that have the largest area cultivated with rape in 2013

Localities	Cultivated area (ha)	Total production (tonnes	Average yield (kg/ha)
Borcea	2960	7973	2694
Budeşti	3636	10129	2786
Dragalina	1956	6121	3129
Dragoş Vodă	1634	5561	3403
Dorobanţu	1133	3694	3260
Grădiştea	1141	2968	2601
Perişoru	1853	5130	2768

Source: General Division of Agriculture, Calarasi County

It has been established that six localities can be beneficiary of this location, the quantities needed of each and their geographical coordinates. The localities chosen coordinates and possible quantities supplied for each locality are presented in Table 5.

Table 5. Localities, geographic coordinates of localities and possible quantities supplied

Nr. crt.	Localities	Geographic coordinates of localities	Possible quantities supplied (tonnes)
1.	Călăraşi	(60 ; 0)	100000
2.	Fundulea	(90 ; 100)	130500
3.	Lehliu Gară	(145 ; 160)	142000
4.	Budeşti	(0 ; 195)	85000
5.	Oltenița	(65 ; 170)	120000
6.	Dragalina	(75 ; 145)	150000

The localities are shown graphically in a coordinate system in figure 1.

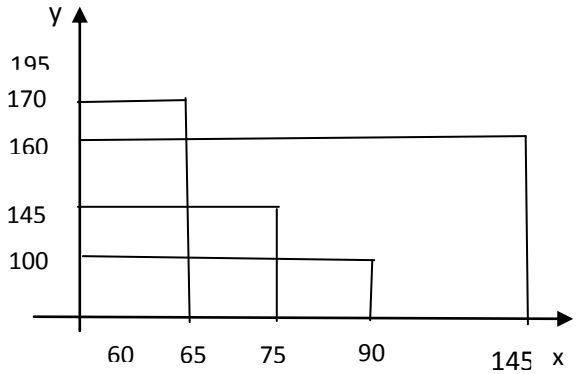

Fig.1. Locating beneficiaries

To determine the optimal location of the processing plant rape in Calarasi County is necessary to find the minimum function:

$$\min (x,y) = \sum_{i=1}^{n} C_i \sqrt{(x - x_i)^2 + (y - y_i)^2}$$

Through this function will determine the number of tonne-kilometers to be transported on a transport tariff ie a price per t / km bulk.

Solution coordinates (x, y) was based on a system of recurrence relations.

The coordinates determined in a first calculation of the following: x = 82 km and y = 130 km, and the value of the function C (x, y) was 42 426 000 tone.

Based on the initial solution to calculate an enhanced version, to give the following results: the coordinates x 'and y' being determined by calculation to x = 130km and y = 85 km, the value of the function C (x ', y') of the 43460500tone was.

The calculation shows that the value function C (x, y) has improved, resulting in a higher value than previously established. The difference C (x, y) - C (x ', y') = 370t/km found to be sufficiently small, the pressure on us to the conclusion that the calculation steps can stop here.

It follows that investment objective may be located at the point having coordinates x = 130km and y = 85km.

If you compare these coordinates with the location of the localities shown in Table. 5 is found that they are very close to the city Lehliu Station coordinates, which means that the optimal investment objective is to be located in this city.

CONCLUSIONS

Following the research it was found that future investment objective on rapeseed processing in bio fuel and edible oil is best to be placed in the city Lehliu Station.

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