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Regional challenges on the South-East Romanian agricultural market

Abstract: *The present paper intends to make an analysis at regional level, respectively in Galati county, in order to determine the present situation of agriculture in the South-East region of Romania; it investigates the possibility of changing the crop structure towards more added value such as vegetables and energy crops (rapeseed, maize) in the region which better respond to the irrigation use. The paper reveals the situation of the irrigation system and the willingness of farmers in the region to pay for irrigations taking into consideration the gross margin value calculated by the main cultivated crops and the type of farms in the respective region. The main investigated aspects are the number of farms and their type, the ownership structure and the degree of land fragmentation, the utilized agricultural area by type of farms, the farm size. At the same time, the paper investigates the crop structure, the irrigated area and the number of irrigation equipment, the number of agricultural machinery and equipment, the market orientation of farms, the type and development level of the non-agricultural activities in the respective county and the specialization of farms in the South-East region of Romania.*

Keywords: *crop structure, irrigated area, gross margin value*

Introduction

The potential of Romanian agricultural markets and the analysis of the regional and local markets in particular represent an important aspect in the agri-rural development of Romania. The regional approach to agricultural markets is intended to represent a modality to create complementarities between Romania's agricultural regions (by promoting certain economic and social policies that should contribute to bridge up the regional agri-regional gaps having in view the diversification regional rural economies. At the same time, this approach will permit the re-orienting of regional agricultural producers to those crops that have a high competitiveness potential, with high value-added, that can provide increased incomes to farmers and respond better to irrigation. This paper also gives an overall picture of the agriculture in the region taking a closer look at different aspects that play a role in the economics of irrigation, the crop yields and their farm gate prices, the farmer's willingness to pay for irrigation at a regional level.

Agricultural producers in the South-East region of Romania

The analysis is based upon the statistical data from the agricultural census of 2002, the farm survey of 2005 and upon a regional survey conducted in the respective county in the year 2006.

According to the Agricultural Survey, 2005, the main agricultural producers in Galati are represented by individual producers (99%) and commercial companies, units belonging to public administration and others (1%). The individual producers manage 68% of land; the commercial companies manage 15%, the agricultural associations 11% and the units of public administration 5%. In the period 2002–2005, a decrease in the number of both individual producers and legal entities took place (Table 1). The average farm size of an individual producer is 2.2 ha, while the average farm size of a commercial company is 458 ha.

As a benchmark, at national level, in 2005, the number of individual producers was in excess of 4.2 million. The individual producers represent 99.6% of the total number of agricultural producers. The individual producers manage 65% of the land (55% in 2002).

Table 1. Number and agricultural area of agricultural holdings

Types of agricultural holdings	No. of farms (2002)	Agricultural land (2002 – ha)	No. of farms (2005)	Agricultural land (2005 – ha)	Average area (2005 – ha/farm)	Managed land as % of total land	Changes in number (2005/ /2002)	Changes in area (2005/ /2002)
Individual farmers	107047	188955	103737	228859	2.2	68%	97%	121%
Legal entities	428	153970	350	109570.3	313.1	32%	82%	71%
Agricultural associations	69	44420	61	38436.3	630.1	11%	88%	87%
Commercial companies with dominant private participation	122	75177	111	50880	458.4	15%	91%	68%
Commercial companies with dominant state participation	na	na	3	1494	498.0	0%	na	na
Units of public administration	125	33651	91	18088	198.8	5%	73%	54%
Other type	112	723	84	672	8.0	0%	75%	93%
Total	107903	342925	104437	338429.3	4.3	100%	97%	99%

na: Not applicable

Source: Agricultural census 2002, Farm survey 2005

The commercialization of the agri-food products

Considering the number of hectares managed by individual producers one can say that the degree of agri-food commercialization of the individual producers is very low.

Table 2. Marketability of products by agricultural holdings

Agricultural holdings	Self consumption	%	Surplus is meant for commercialization	%	Mainly for commercialization	%
Individual holdings	78718	74	21159	20	7170	6
Legal entities	97	23	70	16	261	61
Agricultural associations	4	6	27	39	38	55
Commercial companies	9	7	12	10	101	83
Units of public administration	48	38	14	11	63	50
Other type	36	32	17	15	59	53
Total	78815	–	21299	–	7692	–

Source: Agricultural Census, 2002

Table 2 reveals that 74% of individual producers produce only for self consumption (i.e. they are semi-subsistence farmers), while 83% of commercial companies and 55% of the legal agricultural associations produce mainly for commercialization purposes. Accordingly, only 6% of individual producers are market oriented and 20% of them have some surplus which is meant for commercialization.

Farmers' specialization

At the county level, 77% of individual producers are specialized both in crop production and livestock breeding.

The legal entities are specialized mainly in crop production (84%), 14% have a mixed specialization and 2% are specialized only in livestock breeding.

Table 3. Specialization of agricultural producers

Types of agricultural producers	Total no.	Mixed livestock and crop production	Only crop production	Only livestock breeding
Individual producers	107047	82795	21375	2877
<i>% of the total number</i>	–	77%	20%	3%
Legal entities	428	60	361	7
<i>% of total number</i>	–	14%	84%	2%

Source: Agricultural Census, 2002

Farm size

The size of agricultural holdings is very much polarized. 98% of the total number of farmers manages farms between 0.1–10ha, representing 51% of the total utilized area and only 2% of them manage farms with a size from 10 to100 ha.

Table 4. Agricultural holding size

Farm size	0.1–10ha	10–100 ha	> 100 ha	Total
Number of holdings	99891	1763	267	101921
% of the total number	98%	2%	0%	100%
Total utilized area, ha	165129.5	39685.1	121602	326416.6
% of the total utilized area	51%	12%	37%	100%
Average farm size	1.7	22.5	455.4	3.2

Source: Farm survey, 2005

The average farm size is 1.7 ha for farms belonging to the category 0.1–10 ha, 22.5 ha for farms belonging to 10–100 ha category and 455 ha for farms category larger than 100 ha.

Land tenure

Available data on land tenure reveals that 78% of the total number of agricultural holdings owns the land, 2% rent in land, 6% take land in part, 8% use land with free title, 6% have other type of ownership.

The agricultural holdings with size between 10–100 ha and more than 100 ha own about 40% of agricultural land and the rest rent in or have some other ownership rights on the land. The legal entities are more dynamic in comparison with individual producers. The legal entities own 15% of the managed arable land and rent in 85% of it. This dynamic is the same for the commercial companies with farm size larger than 100 ha – they own 14% and rent in 86% of the arable land. The average size of the land owned is 134 ha while the average size of the rented land is 401 ha.

Land fragmentation

Land fragmentation is quite high with 35% of agricultural area having 4 parcels. Agricultural farmers with three parcels represent 23% of the area. Table 6 reveals the land fragmentation in the Galati County.

It is interesting to note that at the county level, the non agricultural activities carried out by the agricultural producers in the area are very few. These suggest a very small degree of entrepreneurship in the area.

Table 7 reveals that the percentage of those agricultural producers carrying out non-agricultural activities is very small. Meat, milk and vegetable processing are the main activities carried out in the county.

Table 5. Own and rented in land by type of agricultural producers

Specification	Total number	% of the total number	Arable land, ha	% of arable land	Average size, ha
Agricultural holdings	118937	100	326417	100	3
out of which own the arable land	92297	78	165378	51	2
out of which rent in arable land	2137	2	64591	20	30
out of which taken in part	7672	6	17642	5	2
used with free title	9742	8	16799	5	2
other type	7089	6	62006	19	9
Agricultural holdings with farm size between 0.1 and 10 ha	115543	100	165130	100	1.4
out of which own the arable land	90545	78	129302	78	1.4
out of which rent in arable land	1728	2	2451	1	1.4
other type of ownership	23270	20	33376	20	1.4
Agricultural holdings with farm size between 10–100 ha	2994	100	39685	100	304.0
out of which own the arable land	1594	40	14842	37	134.4
out of which rent in arable land	273	9	7519	19	401.6
other type of ownership	1127	38	17324	44	401.6
Agricultural holdings with farm size >100	400	100	121602	100	304.0
out of which own the arable land	158	40	21234	17	134.4
out of which rent in arable land	136	34	54621	45	401.6
other type of ownership	106	27	45747	38	431.6

Source: Farm survey, 2005

Table 6. Land fragmentation

Specification	with 1 parcel	with 2 parcels	with 3 parcels	with 4 parcels	with 5 and more parcels	with 6 and more parcels	Total
Number of agricultural holdings	24750	22956	22038	23862	6285	2030	101921
% of the total number	24%	23%	22%	23%	6%	2%	100%
Total area	30017	50325	72206	111101	40824	15228	319701
% of the total area	9%	16%	23%	35%	13%	5%	100%
Average size of the farm	1.2	2.2	3.3	4.7	6.5	7.5	3.1

Source: Agricultural Census, 2002

Table 7. Non-agricultural activities carried out by individual and legal entities in Galati County

Holdings which carry out non-agricultural activities	Individual	Legal	Total
Meat processing	516	17	533
%	0.5	4	0.5
Milk processing	1543	7	1550
%	1	2	1
Fruits and Vegetables Processing	1719	8	1727
%	2	2	2
Grapes Processing	4140	12	4152
%	4	3	4
Fodder mixing	54	12	66
%	0.1	2.8	0.1
Barley (wheat and maize flour)	148	17	165
%	0.1	4.0	0.2
Wood processing	132	3	135
%	0.1	0.7	0.1
Other processing	222	13	235
%	0.2	3.0	0.2
Agro-tourism	19	1	20
%	0.0	0.2	0.0
Trade	1089	44	1133
%	1.0	10.3	1.1
Transportation (delivery)	337	14	351
%	0.3	3.3	0.3
Handicrafts	216	3	219
%	0.2	0.7	0.2
Other activities	1957	15	1972
%	1.8	3.5	1.8

Source: Farm survey 2005, National Institute for Statistics

Irrigation in the region

This section gives an overview of the irrigation in the region and the main irrigated crops. The irrigated cropping pattern is presented in Table 8.

In 2002, in Galati County 9390 individual farmers irrigated a total of 10215 ha. The main irrigated crop was maize 47.5%, followed by wheat 18.9%, vegetables 13.7% and sunflower 11.1%.

A total of 241 legal entities irrigated 25156 ha. The cropping pattern is quite different from that of the individual producers. The legal entities irrigate mainly wheat (25.6%), maize (20%), soybean (19.6%), and sunflower (13.7%).

Table 8. Irrigated area, cropping pattern, number of individual holdings that irrigate

Individual holdings	Irrigated area – ha	Cropping pattern %	Number	%
Wheat	1926.2	18.9	462	4.9
Maize	4820.3	47.2	3772	40.2
Sun-flower	1136.3	11.1	501	5.3
Soybean	152.0	1.5	15	0.2
Sugar beet	83.1	0.8	54	0.6
Potatoes	115.9	1.1	158	1.7
Vegetables	1396.4	13.7	3455	36.8
Fodder	406.3	4.0	407	4.3
Vineyards	32.4	0.3	228	2.4
Orchards	3.4	0.0	7	0.1
Meadows	2.3	0.0	3	0.0
Other crops	140.8	1.4	328	3.5
Total	10215.3	100	9390	100

Source: Agricultural Census, 2002

Table 9. Irrigated area, cropping pattern, number of legal entities, which irrigate

Legal entities	Irrigated area – ha	Cropping pattern %	Number	%
Wheat	6440.6	25.6	33.0	13.7
Maize	5061.7	20.1	59.0	24.5
Sun-flower	3447.8	13.7	39.0	16.2
Soybean	4919.0	19.6	20.0	8.3
Sugar beet	171.0	0.7	8.0	3.3
Potatoes	220.8	0.9	11.0	4.6
Vegetables	795.8	3.2	22.0	9.1
Fodder	1820.4	7.2	32.0	13.3
Vineyards	962.0	3.8	3.0	1.2
Orchards	216.0	0.9	2.0	0.8
Meadows	98.0	0.4	1.0	0.4
Other crops	1003.1	4.0	11.0	4.6
Total	25156.1	100	241	100

Source: Agricultural Census, 2002

The statistical data and the survey carried out in this county show that the main water users are of two types – individual producers (market-oriented) and commercial companies (legal entities).

Table 10 reveals that only 19% of the area farmed by individual farmers is covered by irrigation infrastructure while the area with irrigation infrastructure belonging to legal entities represents 26%.

Table 10. Number and area by types of agricultural producers with irrigation infrastructure, 2002

Type of agricultural producers	Number of holdings with irrigation infrastructure	Area with irrigation infrastructure	% of the area with irrigation infrastructure	Average size of irrigable area/holding, ha
Individual producers	20986	35616.7	19%	1.7
Legal entities	123	40443.9	26%	328.8
Total	21109	76060.6	22%	3.6

Source: Agricultural census, 2002

By type of agricultural producers, in Galati County, 97% of individual producers irrigate 29% of the irrigable area, while 3% of the legal entities irrigate 71% of the irrigable land.

Table 11. Irrigation application by types of agricultural producers

Type of agricultural producers	No of holdings irrigating	Irrigated area, ha	% of the irrigated land	% of the agricultural producers
Individual producers	9390	10215.3	29%	97%
Legal entities	241	25156.1	71%	3%
Total	9631	35371.4	100%	100%

Source: Agricultural census, 2002

Table 12, reveals a change in the irrigated cropping pattern. In 2005, mainly vegetables and maize were irrigated, compared to 2000 when the irrigated cropping pattern was a little bit more diversified.

Table 12. Irrigated Cropping Pattern Galati, %

Specification	2005	2004	2003	2002	2001	2000
Wheat	7.6	16.4	8.3	23.6	27.1	0.0
Barley	5.0	4.7	2.8	4.2	1.6	0.0
Maize	41.8	38.7	42.8	33.1	36.8	40.2
Sun-flower	6.9	7.4	9.9	10.7	7.3	11.4
Soya	9.6	20.2	23.9	16.0	14.1	24.4
Sugar beet	0.0	0.4	2.0	0.8	0.3	2.7
Potatoes	5.0	2.2	1.8	1.7	1.6	1.9
Vegetables	24.1	10.0	8.5	9.8	11.2	19.5
Total	100	100	100	100	100	100

Source: National Institute for Statistics, 2005

The economics of irrigation

Data collection

The analysis provided in this section is based mainly on the information obtained during the regional field survey carried out in 2006 using structured questionnaires. In total 100 farmers, mainly water users were interviewed. Also, part of the data came from informal interviews with representatives of commercial companies. Based on a structured questionnaire, this paper investigates which are the first three most important crops the farmers would like to cultivate and how much they would be willing to pay in order to irrigate these crops.

Gross margin for the most representative crops

Table 13 presents the results obtained following the processing of the data collected during the field survey. The gross margin was determined as difference between revenues and total cost including the irrigation costs. It seems that in the region the most responsive crops to irrigation are vegetables, followed by maize for seed, maize, sunflower and rapeseed.

The willingness to pay for irrigation

Table 14 presents the gross value as declared by the farmer and how much of this value the farmer would be willing to pay for irrigation. Accordingly, during the field survey in Galati County, the farmer was asked to assess based on the information he had provided a gross value per hectare of the three most cultivated crops. After establishing this gross value, the farmer was asked, having this value in mind, how much he was willing to pay for irrigation per hectare. Out of 100 interviewed farmers, 92 farmers would irrigate their first crop.

The expressed willingness to pay varies from more valuable crops to less valuable crops. The crops having a higher value per hectare, when expressed as a percentage of the crop gross value, have a relatively less weight than it is the case of lower value crops like wheat, maize and soybean.

From Table 14, one might conclude that the willingness of the farmer to pay expressed as a percentage of the crop gross value might differ very much depending on the crop and farmer's situation. The farmers who did not receive irrigation are relatively more eager to irrigate than those who irrigated.

However, if this value increases due to the fact that the farmer grows higher valued crops, this percentage decreases but the amount/hectare increases to an average of euro90/ha. Farmers who have orchards indicate that they are even willing to pay 379 euros/ha. Farmers who cultivate vegetables also indicate a higher fee for irrigation.

From this assessment it can be concluded that there is sufficient willingness to pay for the irrigation water; nevertheless, this is a demand that relates very much to the type of crop, the development stage of the crop and the weather conditions of the moment.

Table 13. Gross margin and incremental benefit for rain fed (R) and irrigated (Irr) crops in Galati County

Specification	R Wheat	Irr Wheat	R Maize	Irr Maize	R Sun Flower	Irr Sun Flower	R Soy- bean	Irr Soy- bean	R Maize for seed	Irr Maize for seed	R Rape- seed	Irr Rape- seed	R Toma- toes	Irr Toma- toes	R Pea	Irr Pea
Gross margin (euro/ha)	39	125	47	362	65	337	58	436	190	794	171	340	145	2418	43	1118
Incremental benefit (euro/ha)	-	86	-	316	-	272	-	379	-	604	-	169	-	2273	-	1076
Water requirement 000m ^{^3}	-	1	-	2.4	-	1.4	-	2.8	-	2.4	-	1	-	3.2	0	1.8
Incr. benefit/1000cum (euro/ha)	-	86	-	132	-	194	-	135	-	252	-	169	-	710	-	598

Source: own calculation based on interviews with agricultural producers in the area

Table 14. Gross value and willingness to pay for irrigation

First Crop	Will to pay for irrigation			2ND Crop			Will to pay for irrigation			3rd CROP			Will to pay for irrigation		
	Gross Value euro/ha	Number of respondents #	euro/ha	%	2ND Crop	Gross Value euro/ha	Number of respondents #	euro/ha	%	3rd CROP	Gross Value euro/ha	Number of respondents #	euro/ha	%	
Orchards	5101	6	379	7	Onion	3737	3	171	5	Vegetables	3182	1	91	3	
Potatoes	4318	8	167	9	Egg plant	3030	1	152	2	Potato	3030	1	61	3	
Carrots	3409	2	72	2	Fruits	3030	1	606	2	Onion	1667	2	144	7	
Vegetables	2374	6	234	7	Vegetables	1131	3	147	5	Wheat	869	6	41	20	
Tomato	1991	7	133	8	Melon	758	1	76	2	Melon	758	2	152	7	
Egg plant	1707	3	290	3	Barley	509	1	27	2	Lucerne	564	5	57	17	
Rapeseed	564	3	82	3	Wheat	499	13	35	21	Sunflower	455	5	75	17	
Sunflower	375	2	27	2	Maize	420	18	50	30	Maize	417	4	54	13	
Maize	362	27	45	29	Soybean	378	3	61	5	Rye	273	1	45	3	
Lucerne	333	7	40	8	Coriander	273	1	18	2	Soybean	199	2	56	7	
Barley	333	1	30	1	Sunflower	256	10	36	16	Coriander	136	1	15	3	
Wheat	291	10	35	11	Rye	212	1	30	2						
Soybean	236	9	36	10	Lucerne	152	4	24	7						
Rye	182	1	9	1	Rapeseed	152	1	15	2						
Total	-	92	-	100	Total	-	61	-	100	Total	-	30	-	100	

Source: regional field survey, 2006; own calculations

Also, it might be noticed that farmers are less willing to pay for energy crops than for vegetables, which seems to have a higher incremental benefit/ha. The area also has tradition in cultivating vegetables.

Conclusions

The agricultural in the south-east region of Romania is defined by subsistence farming, with a quite a high degree of land fragmentation. Non-agricultural activities carried out by agricultural entities are very few.

In 2005, at regional level, on the average, not more than 12% was irrigated. Part of the problem is the cost of irrigation, which is quite high. Individual farmers irrigate less than the legal entities.

Farmers are inclined to wait for rain, even when the crop is wilting. Most of the smallholders do not have the cash to pay upfront for the water charges. On the other hand, even if individual farmers would like to irrigate and have the funds, the actual water supply depends on the total demand at the time of the request. If the combined request of the farmers does not pass a certain threshold area of volume, the national water supply provider will not start putting the pumping stations in operation and fill an extensive network of canals with poorly functioning gates with water as the costs would be higher than the returns.

Farmers tend to irrigate highly valuable crops in the region namely vegetables, followed by energy crops, which seems to respond less to irrigation. In addition to that, the crop resistance to drought is very important in the irrigation decision process.

Nevertheless, the energy crops tend to become more and more attractive, due to the fact that beginning with 2007 the first bio-fuels capacities were built in the country.

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