

**NATIONAL REPORT ON AGRO-FOOD SECTOR
CROATIA**

WBC-INCO.NET

Authors

Željka Mesić, Department of Agricultural Marketing, Faculty of Agriculture, University of Zagreb

Jerko Markovina, Department of Agricultural Marketing, Faculty of Agriculture, University of Zagreb

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1 PREFACE

This National report is compiled within the framework of WBC-Inco.net project and its main goal is to describe current situation in the agri-food sector in Croatia regarding main economic indicators and research policies.

The report is based mainly on secondary quantitative data gathered from different sources, both from Croatian and European institutions.

The report also includes a SWOT analysis of the sector. The basis for the SWOT analysis was the interviews conducted with various experts from scientific community and managers who work in agro-food companies. Some data for the analysis were taken from previous research conducted by Faculty of Agriculture in Zagreb.

2 INTRODUCTION

The Republic of Croatia is a small country with a population of about 4.4 million people and a total land area of 56,542 km² (territorial sea makes up 31,067 km²). The country is characterised by considerable natural and climatic diversity, making it a popular tourist destination. This diversity is also reflected in the range of agricultural production, ranging from traditional continental arable and industrial crops to vineyards and to Mediterranean fruits and vegetables.

The country can be divided broadly into three natural and geographical areas, namely:

- The Pannonian and Peripannonian region, consisting of valleys and hills in the North-East of Croatia where arable farming and pig and cattle breeding predominate.
- The Mountainous Region, dividing the Pannonian region from its coastal area where small-scale private farms prevail with cattle breeding as the main branch of agricultural production.
- The Adriatic coastal region, covering a narrow coastal belt, which is separated from the hinterland by high mountains. The Adriatic coast consists of more than 1,000 islands and is

one of the most indented in Europe. The mild climate enables the production of Mediterranean crops.

Croatia declared independence from Yugoslavia in 1991. The war in the early 90's caused a collapse of the economy and major losses of productive capacity. In 1995, the Dayton Peace Agreement was concluded, bringing a degree of security and stability to the region. The Croatian government, during this period, remained committed to privatisation and other structural reforms of the economy but the authoritarian regime of that time limited international acceptance and integration. In 1999 the political landscape changed drastically and since this time Croatia has been making significant progress towards economic and political stabilisation. The country became a member of the Partnership for Peace initiative of NATO and joined the WTO in 2000. A Stabilization and Association Agreement (SAA) with the EU was signed in 2001 and entered into force in 2005. An Interim Agreement on trade and trade-related matters had been applied since 2002. Following a positive opinion by the Commission on Croatia's application for EU membership, Croatia was awarded Candidate Country status in June 2004 and has continued to implement wide-ranging restructuring and reforms. Since December 2005 Croatia is in the so-called "screening process", an exercise, which brings together experts from Croatia and from the European Commission. The screening is the first stage of accession negotiations and will enable the EU to decide upon the opening of individual chapters for negotiations.

3 ECONOMIC DATA OF THE AGRO – FOOD SECTOR

Since the year 2000, the national economic situation is characterized by significant economic growth, which can be seen in the increase and stabilisation of the main macroeconomic indicators (Table 1). Agriculture, forestry and fishery sector play an important economic role in Croatia. The total value of agricultural production increased by 17% from 2000 (1.473 million EUR) to 2005 (1.780 million EUR), yet its share in total GDP decreased from 7,37% to 5,75% (see Table 1).

Table 1 Mackroeconomics indicators

	Units	2000	2001	2002	2003	2004	2005	2006	2007
Total area	Km ²	56.594	56.594	56.594	56.594	56.594	56.594	56.594	56.594
Population	'000	4,381	4,437	4,443	4,442	4,439	4,442	4,441	4,441
GDP (in current prices)	mill. €	19.976	22.628	24.758	27.107	29.075	33.047	34.220	37.527
Agriculture, hunting, forestry and fishery	mill. €	1.473	1.670	1.793	1.571	1.678	1.780		
Share In GDP	%	7,37	7,54	7,33	5,99	5,91	5,75		
GDP/capita	€	4.560	4.998	5.507	5.906	6.462	7.038	7.704	8.452
GDP (PPP)/capita	€								
Economic growth (change in GDP)	%	2,9	4,4	5,6	5,3	4,3	4,3	4,8	5,1
Unemployment rate	%	16,1	15,8	14,8	14,3	13,8	12,7	11,2	15,1
Inflation (yearly average)	%	4,6	3,8	1,7	1,8	2,1	3,3	3,2	2,9
Share of food, beverages and tobacco in total household's expenditures	%	36,0	37,7	36,1	36,8	35,5	37,2	36,3	-
Exchange rate (1 EUR =KN)		7,60	7,37	7,44	7,65	7,67	7,37	7,35	7,33

Source Croatian Bureau of Statistics (CBS), 2008

Agricultural production together with forestry and fishery sector in the year 2001 amounted 1.670 million EUR – approximately 197 million more than in year 2000. Share of stated sectors in total GDP in the year 2001 was 7,54% thus showing a slight increase compared to year 2000. In the year 2002 there is a significant raise in total amount of agricultural production up to 1.793 million EUR but the share in total GDP is decreasing for 2,8% on 7,33%. In the year 2003 there is a decrease in total production for 5,69% compared with 2002 and also a decrease of share in total GDP on 5,99% due to the consequences of the long-lasting drought in the year 2003. In the next four years there is a raise in amount of total production and also a decrease of share in total GDP thus showing that the whole economy is forwarding much faster than agriculture (Ipard, 2007).

The latest data for 2007 show that Agro-food imports had a share of 8.3 % of total Croatian imports. Agro-food exports amounted to 10, 6 % of total Croatian exports in 2007. Both the value and patterns of trade have been changing over the last ten years.

Table 2 Importance of agro-food trade in Croatia

	Units	2000	2001	2002	2003	2004	2005	2006	2007
Agro-food trade	mill. €	1.187	1.44,2	1.621,6	1.738,2	1.744,8	2.023,4	2.422,4	2.533,0
Agro-food exports	mill. €	441,05	495,8	559,7	624,0	560,4	716,1	949,15	960,4
Agro-food imports	mill. €	746,17	951,4	1.062,9	1.114,2	1.184,4	1.307,3	1.473,3	1.572,6
Agro-food trade balance	mill. €	-305,1	- 457,7	- 503,1	- 490,2	- 623,9	- 591,1	- 524,15	- 612,2
Share of agro-food trade in:									
- Total exports	%	9,2	9,5	10,8	11,4	8,7	10,1	11,2	10,6
- Total imports	%	8,7	9,3	9,4	8,9	8,9	8,8	8,7	8,3

Source: CBS, DAES (Kumrić, Franić, 2007), CCE

3.1 Main Economic Sub sectors of the Agro - food Sector

Cereals

In 2007 the most significant sub – sector is cereals production, with a share of GAO of approximately 23%. The production of cereals takes up 66% total arable surface in Croatia. Maize (1. 425 000,00 t produced in 2007) and wheat (812,000t in 2007) are the most important commodities in this sector.

The Ministry of Agriculture wants to reduce area under wheat to 100 thousand hectares because of expensive support they are providing for wheat production.

The main reasons for Croatian cereals production not being competitive compared to European agriculture are small farms, small scale of production as well as technological problems (e.g. seed and outdated machinery), (Cerjak, Mesić, 2006).

Oil crops

In the period 2000 – 2005 oil crops were cultivated on an approximately 6% of the total arable land. Areas covered with oil crops in the last five years have been approximately 80.000 ha for one year.

In the production structure, the most abundant is soybean, produced on approximately 50% of areas, than sunflower and oilseed rape, produced on, in average, 13.000 ha. In the last few years and especially between 2002 and 2003, there was a significant increase of areas covered with these crops. The most significant increase of areas is the one of soybean. Oilseed rape

and sunflower production are recording slightly increasing growth from one year to another. In the last four-year period, changes and growth in the sowing areas have showed market needs for these products. The importance of soybean as a grain legume is manifested primarily in the production of oil cakes and also oil. Soybean oil comprises approximately 42% of manufactured raw oil from domestic oil crops (Ipard, 2007).

Fruit and Vegetables

Fruit production in Croatia is mostly based on production located on agricultural farms and is mostly not market directed. In 2007 the F&V sector represents 12 % of the Gross Agricultural Output (GAO). In general in both fruit and vegetable sub-sectors a sensitive decreasing of production is recorded. As for fruits, the most important are grapes followed by apples and plum. Current circumstances of home fruit production do not satisfy even 50% of domestic needs. The reasons for it are mostly state inherited, i.e. disregard and lack of recognition of fruitgrowing in Croatia within the longer period before independence (then the valid unofficial distribution of production in ex Yugoslavia in which the priority in fruit and vegetable production was given outside Croatia (Macedonia, Serbia) and in Croatia was located the processing based on raw materials from that area), war period (for almost 10 years), and later the shortage of more stimulating agricultural policy measures which were no good for restructuring of existing ones, mostly extensive and agricultural production, into working and capital intense production in fruit growing, viticulture, olive growing, vegetable growing and floriculture. Subsequently because of such unfavourable production structures, and lack of organization of market, Croatia imports significant quantities of all types of fruit, apples more than 50% of home consumption, pears 80% and peaches 70%.

Vegatables

A wide range of vegetable production in Croatia is possible in the whole country, thanks to geographical and climate differences. According to statistical data, vegetables in Croatia occupy around 135.000 ha, or 9,3% of total arable land and gardens. Regarding the vegetables, potatoes are the most important, followed by cabbages and tomatoes.

Livestock production

Livestock contribution to the GAO (gross agricultural output) is 46.74% in 2007. Most important production in terms of GAO is cow milk (13.23%), followed by pork (12.18 %), poultry (7.64%) and cattle (7. 27%).

Production is carried out in small scale units (with the exception of poultry sector) and that represents one of the main problems: small units can't ensure a competitive production and the fulfilment of ecological and animal welfare requirements. In the poultry sub-sector the situation is different because both poultry meat and eggs production is characterised by large scale production companies.

Cattle production is one of the most important sub-sectors in the Croatian agriculture and is characterised by an extensive management. The Country is not self sufficient both in beef and in milk production. In beef production, self sufficiency rate doesn't reach the 80% while in milk production self sufficiency rate is around 85%.

Only poultry sub-sector reaches the self-sufficiency with a rate of 101% and it represents an important livestock industry. Poultry industry has adopted high level of technology. Croatia has many traditional meat products which have good export potential. This is especially true for those products that will obtain protected designation of origin or protected geographical indication (Cerjak, Mesić, 2006).

Table 3 Shares of individual products in agricultural output (%)

	2000	2001	2002	2003	2004	2005	2006	2007
Cereals (including seeds)	18.29	20.97	19.63	15.81	22.27	18.11	33.78	23.01
Industrial crops	3.50	4.39	5.03	4.24	5.68	6.42	6.03	7.07
Forage plants	5.80	6.52	6.50	5.79	2.95	0.86	0.75	0.78
Vegetables and horticultural products	8.46	8.18	9.30	8.50	5.03	3.72	2.53	4.04
Potatoes (including seeds)	7.90	5.56	4.19	5.77	5.48	2.85	2.75	3.32
Fruits	5.27	5.00	4.13	4.49	5.04	4.40	4.78	4.30
Wine => GRAPES	10.21	9.06	9.55	10.76	10.58	8.82	7.04	8.83
Olive oil => OLIVES	0.85	0.96	1.53	0.47	1.33	1.86	0.86	1.80
Other crop products - Cosmetic and pharmaceutical plants	0.08	0.07	0.12	0.11	0.01	0.27	0.13	0.10
CROP OUTPUT	60.35	60.71	59.97	55.94	58.37	47.32	58.64	53.26
Cattle	6.46	4.93	6.41	7.24	6.60	8.88	6.52	7.27
Pigs	13.64	15.31	14.14	14.56	13.35	15.96	12.24	12.18
Equines	-	-	-	-	-	-	-	-
Sheep and goats => Sheep only	1.73	1.53	1.58	2.36	1.90	2.25	1.39	1.46
Poultry	6.28	5.74	5.20	5.68	5.40	7.50	6.56	7.64
Other animals	-	-	-	-	-	-	-	-
Milk => Cow' milk	7.20	8.04	8.96	9.46	9.53	12.59	10.48	13.23
Sheep milk	0.37	0.32	0.27	0.35	0.52	0.47	0.38	0.44
Goat's milk	0.18	0.15	0.15	0.31	0.28	0.32	0.24	0.31
Eggs	3.66	3.13	3.14	3.88	3.66	4.42	3.36	4.01
Other animal products								
Honey	0.12	0.14	0.17	0.22	0.38	0.30	0.19	0.18
ANIMAL OUTPUT	39.65	39.29	40.03	44.06	41.63	52.68	41.36	46.74
AGRICULTURAL GOODS OUTPUT	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AGRICULTURAL SERVICES OUTPUT	-	-	-	-	-	-	-	-
AGRICULTURAL OUTPUT	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's calculation based on CBS, (Kumrić, 2008)

Dairy industry is one of the most important parts of Croatian agribusiness. The share of milk production in the total value of agricultural production in 2007 was 13.23%. There are around 3.500 workers employed in the processing of milk or 7.95% of all employees in the food industry. According to data from Croatian Chamber of Economy, in 2007, Croatian milk industry has made 672 million Euro of revenues and profit before income tax of 24.7 million euro (*Kovačić, 2008*).

3.2 Main exported products of the Agro- food sector and main destinations

The top five of the exports are all processed agro-food products. The top export commodities in value terms in 2007 were sugars & sugar confectionery (€157,727 mill.), miscellaneous edible preparations (€111,347 mio), Fish and crustaceans, molluscs and other aquatic invertebrates (€95,766 mill.), Tobacco & tobacco products (€88,581 mill.) and cereals (€83,626 mill.).

Table 4 Agro-food exports by commodity group (in million Euro and %)

	Units*	2003	2004	2005	2006	2007
Live animals	mill. €	1,769	1,605	1,619	3,534	9,998
Meat and edible meat offal	mill. €	7,412	6,723	10,667	11,867	13,957
Fish and crustaceans, molluscs and other aquatic invertebrates	mill. €	85,907	77,935	65,093	115,694	95,766
Dairy produce, eggs, natural honey	mill. €	31,473	28,552	29,197	30,765	44,575
Other products of animal origin	mill. €	9,083	8,240	2,977	2,241	4,696
Live plants and floricultural products	mill. €	0,476	431	0,662	0,889	1,232
Edible vegetables, plants, roots, tubers	mill. €	2,579	2,340	3,575	4,05	6,484
Edible fruit and nuts, peel of citrus fruit or melons	mill. €	2,858	2,593	4,633	10,412	16,703
Coffee, tea, mate, spices	mill. €	4,231	3,838	4,462	4,762	5,480
Cereals	mill. €	36,361	32,987	10,817	36,087	83,626
Products of the milling industry, malt, starches	mill. €	3,780	3,430	4,903	8,8	12,651
Oilseeds, oleaginous fruits	mill. €	18,098	16,418	18,436	14,867	23,678
Lac, gums, resins, other vegetable saps and extracts	mill. €	0,106	0,096	0,190	57,412	0,130
Vegetable plaiting materials, other products of vegetable origin	mill. €	0,102	0,093	0,032	21,529	0,055
Animal or vegetable fats and oils	mill. €	18,219	16,528	21,449	20,499	21,940
Meat preparations	mill. €	37,536	34,053	42,743	40,123	46,909
Sugars and sugar confectionary	mill. €	111,92	101,536	120,280	165,712	157,727
Cocoa and cocoa preparations	mill. €	25,919	23,513	58,163	116,557	43,916
Preparations of cereals, flour or starch	mill. €	30,219	27,415	39,162	42,214	49,569
Preparations of vegetables, fruit or nuts	mill. €	9,510	8,628	19,472	16,402	17,836
Miscellaneous edible preparations	mill. €	81,395	73,842	103,677	120,551	111,347
Beverages, spirits and vinegar	mill. €	42,082	38,177	56,707	68,313	80,866
Residues and waste from the food industries	mill. €	16,772	15,215	19,784	24,685	22,669
Tobacco and manufactured tobacco substitutes	mill. €	103,16	93,538	101,334	90,123	88,581
Total agricultural products	mill. €	680,95	617,726	740,035	949,148	960,4

Source: CBS

Table 5 Main Destination of Exported Agro – Food Products

All figures in €mill	2006	2007
Export		
EU-15		
<i>of which:</i>		
-Italy	150	150
-Germany	61	43
-Austria	53	37
EU-12		
<i>of which:</i>		
-Slovenia	66	80
-Hungary	38	30
-Poland	30	12
-Check Republic	26	26
-Romania	13	13
Western Balkan		
<i>of which:</i>		
Bosnia and Herzegovina	236	311
Srbia+Montenegro	70	85
Macedonia	19	23
Other		
-USA	13	13

Source: Croatian Chamber of Economy based on CBS, 2007

As shown in table 5 main Croatian export destination in 2007 was Bosnia and Herzegovina, we exported 311 million € of agricultural and food products there. Followed by Italy with 150 million €, Serbia and Montenegro with 85 million € and Slovenia with 80 million €.

In 2007 the majority of food is imported from Italy (€181 mill.), Germany (€165 mill.), Brasil (€145 mill.) and Hungary (€107 mill.).

3.3 Research expenditures

Since 2000 the total expenditure on research and development (GERD)¹ is constantly growing, and despite some decline in 2005 (from 1.22% of GDP in 2004 to 0.93% of GDP in 2007).

The total budget of the MSES accounted for 4.1% of the GDP in 2004. If we add the expenditures of the MSES to expenditures made by other central ministries and at the local level, public education expenditures amounted to 4.53% of the GDP in 2004. (See table 6). (ESDP 2005-2010, p.17).

¹ *Gross domestic expenditure on R&D (GERD) is a total inland expenditure on R&D performed on the national territory during the reporting calendar year, and consists of gross current and capital expenditures.*

Investment in R&D in Croatia has been constantly growing since the mid-1990s, from 0.71% of BDP in 1998 to 1.22% in 2004. The Croatia has a relatively high rate of investment in research and development (R&D), but there is disproportion of investment between the public and the private sector. In 2004, total expenditure on R&D was 1.22% of GDP, it was above the average of the new EU member States (Poland, Hungary, Lithuania, Estonia, Latvia etc.). However, R&D expenditure by the private sector is relatively low, 0.51% of GDP compared to 1.22% of GDP of EU15 (ERAWATCH).

Table 6 Some indicators of Research and Development (R&D) in Croatia, 2004

Indicator	
Total public expenditure on education as a percentage of GDP	4.53*
Gross domestic expenditure on R&D (GERD), % of GDP	1.22
R&D expenditure by sector, % of GDP	
Business enterprise sector	0.51
Government sector	0.25
Higher education sector	0.45
Exports of high technology products as a share of total exports	11

* year 2003

Source: EUROSTAT

4 RESEARCH RESOURCES FOR AGRIFOOD SECTOR

Public research activities are dominantly financed by budget resources allocated by the Ministry of Science, Education and Sports (MSES) through the two main channels: institutional funding and research grants. Government finances 77% of university research and 79% of public institutes' research while the business sector finances a small portion of university research (6.2%) and that of public institutes (3%).

The business R&D sector includes 13 private scientific institutions, of which six are in-house institutes affiliated with large industrial corporations. The majority of business research is financed by business companies themselves (76%) while the government contributes to the business sector with 21% and foreign investors with 3%.

The total funding of R&D in Croatia from abroad is rather small (2.6% of GERD), the majority coming from private businesses for licenses or contract research (46%), while foreign governments and higher education institutions participated with 19% .

Science policy in Croatia is based on a horizontal approach in which all research areas should be treated equally in order to attain an equal level of scientific excellence. The substantive part of budget resources for R&D is distributed through the MSES programme [Research Projects](#) and is intended for all fields of science regardless of the thematic area and type of research. However, the budget is designed to assure the balanced development of the six main fields of science usually serviced by the MSES in terms of the planning, monitoring and evaluation of research activities. The budget of the Research Projects programme in the total amount of HRK142.5mill (€19.6mill) in 2007 was distributed according to the six scientific fields as follows (ERAWATCH):

1. Natural sciences - 25%
2. Technical sciences - 23%
3. Bio – medical sciences - 23%
4. Bio – technical sciences - 12
5. Social sciences - 9%
6. Humanities - 8%

4.1 Main research infrastructure

The Croatian research and higher education system consists of 7 universities, 26 public research institutes, 11 research centres in the industry sector, 16 public colleges and polytechnics, and 16 private colleges and polytechnics which are accredited by the MSES.

Below it is presented the list of main Research Infrastructures currently existing in Croatia in the field of agri - food and agriculture. For each unit, its subdivisions are given.

A UNIVERSITY OF ZAGREB

1. Faculty of Agriculture

The Faculty of Agriculture in Zagreb is the leading institution of its kind in the Republic of Croatia, with respect to the number of researchers and their activities in the field of agricultural sciences and the profession, in that more than 200 researchers are involved in scientific and research work. Main research subjects are: preservation of the biodiversity of plants and autochthonous indigenous breeds of animal, pollution of soils and waters, effective plant protection, application of biotechnology in agriculture, application of geoinformatics science in agriculture, new technologies for sustainable and renewable(organic) agricultural production, new food production technologies, evaluation and preservation of landscapes and the heritage of garden-come-park architecture, socio-economic and marketing analyses of Croatian agriculture, competitiveness of Croatian agriculture on the domestic and world markets.

Organisations

- Department of Agricultural Botany
Department of Agricultural Economics and Rural Sociology
Department of Agricultural Engineering
Department of Agricultural Technology, Storage and Transport
Department of Agricultural Zoology
Department of Animal Nutrition
Department of Animal Science I
Department of Animal Science II
Department of Chemistry
Department of Dairy Science

Department of Farm Management
Department of Field Crops, Forage and Grassland
Department of Fisheries, Apiculture and Special Zoology
Department of General Agronomy
Department of Herbology
Department of Information Science and Mathematics
Department of Marketing in Agriculture
Department of Microbiology
Department of Ornamental Plants, Landscape Architecture and Garden Art
Department of Plant Breeding Genetics, Biometrics and Experimentation
Department of Plant Nutrition
Department of Plant Pathology
Department of Pomology
Department of Seed Science and Technology
Department of Soil Amelioration
Department of Soil Science
Department of Vegetable Crops

- Department of Viticulture and Enology

2. Faculty of Food Technology and Biotechnology

Food Technology and Biochemical Engineering involves the application of engineering principles to the design, construction and operation of industrial processing plants. Nutrition students are provided with opportunities to explore various food technology and biochemical engineering related fields – food engineering, food processing, bioengineering and nutrition.

Organisations

- Department of Chemistry and Biochemistry
 - Department of Process Engineering
 - Department of Food Quality Control
 - Department of Biochemical Engineering
 - Department of Food Engineering
 - Department for General Programmes

3. Faculty of Veterinary Medicine

Veterinary Medicine plays a significant role in public health by ensuring that foods of animal origin are healthy and of high quality. It is well known that veterinarians, through their unique role in the production and distribution of food, increase the trust of the consumers as well as the success of intensive livestock production.

4. Faculty of Pharmacy and Biochemistry

5. Faculty of Forestry

A Forestry Department

B Wood technology Department

B UNIVERSITY OF OSIJEK

1. The Faculty of Agriculture
2. The Faculty of Food Technology

C UNIVERSITY OF SPLIT

- Department of Mediterranean Agriculture and Landscape
- Faculty of Chemical Technology

D OTHER RELEVANT INSTITUTIONS (college and institute):

- The School of Professional Higher Education in Agriculture, Križevci
- Polytechnic College in Knin
- Institute for Adriatic Crops and Karst Reclamation in Split
- Institute for Agriculture and Tourism in Poreč

Public services in agriculture and food industry

- Veterinary institutions
- Croatian Livestock Centre

Plant production institutions

- Fruit Growing Institute
- Croatian Institute of Viticulture and Oenology
- Food safety institutions

- Croatian Agricultural Extension Institute (CAEI)
- Croatian Market Information System in Agriculture (TISUP)

The schooling of agricultural experts of different specialities is organised in two colleges as university undergraduate, postgraduate and doctorate studies (the Faculty of Agronomy in Zagreb and the Faculty of Agriculture in Osijek) and as a professional course lasting three years (the Polytechnic College in Križevci, Knin, and in Požega; on the Institute for Adriatic Crops and Karst Reclamation in Split and Institute for Agriculture and Tourism in Porec). In addition to the colleges, scientific research in agriculture is conducted by regional institutes (there are three regional institutes in agriculture), and in the veterinary and forestry areas, by the Croatian Veterinarian Institute and Forest Research Institute.

In Croatian cities there are relatively numerous centres for adult education: in general their agricultural programmes are focused to wine, spice herbs, mushroom growing and bee-keeping. Also the extension service offers programmes in agricultural matters. Although the number of research and educational institutions is high, the educational offer is still inadequate for the development needs and is lacking in facilities. By several analysis it emerges that it is necessary to improve the cooperation among education systems, researchers and labour market, because the agricultural courses and schools don't offer an interdisciplinary approach (*Žutinić, Mesić, 2006*).

4.2 Number of researchers in the Agro - food Sector

The science and higher education systems in Croatia have undergone important transformations during the last 18 years. In 2007 there were 5.232 researchers (full time)², the 2.874 of them are employed in education sector. In the Agriculture, Food and drink industry and tobacco industry there was 721 researchers (full time).

Table 7 Researchers by sector

		2002	2003	2004	2005	2006
Total Researchers	Full time equivalent	8.572	5.861	7.140	5.124	5.232
Total Business Enterprise Researchers (<i>Agriculture, Food and drink industry, Tobacco industry</i>)	Full time equivalent	1.253	913	1.015	698	721

² *Full-time equivalent (FTE) is expressed in person-years and presents time as a share of full working time in which persons in employment are engaged in the work related to research and development (for example, if a person was engaged in works related to research and development for six months in full working time, it is expressed as 0.5 full-time equivalent – 0.5 FTE).*

Total Government Researchers	Full time equivalent	2.022	2.158	2.420	1.633	1.634
Total Higher Education Researchers	Full time equivalent	5.297	2.790	3.705	2.790	2.874
Total Private-Non-Profit Sector Researchers	Full time equivalent					

Source: DG Research Regional Key Figures Database (based on integrated Eurostat/OECD data)

The human resources development for science and technology in Croatia relies on the two basic types of programmes implemented at the national level. The first type of programme is aimed at rejuvenation of the scientific community, the provision of a sufficient inflow of young researchers and the attracting of the interest of young people in pursuing a scientific career. The most important programme is the Junior Researcher Programme, which provides new employment positions for young researcher at institutes and universities as well as support for their training and education.

4.3 Number of patents the Agro - food Sector

On 31 October 2007, the Government of the Republic of Croatia (HR) deposited its instrument of accession to the European Patent Convention (EPC) and to the Act revising the EPC of 29 November 2000. There is no available data for number of patents specified for the agro – food sector.

Table 8 Patent applications to the Epo by priority year at the national level

	HR - Croatia										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Absolute value	14	11	15	21	18	15	22	37	39	30	24
per million inhabitants								8,3	8,8	6,8	5,4

Source: DG Research Regional Key Figures Database (based on Eurostat)

In Croatia, there are about 100 published papers per one registered patent, whereby it is apparent that the private sector is more inclined to registering patents, while the public sector is more successful in publishing scientific and expert papers. However, based on the number of internationally referenced papers, Croatia is low on the scale of developed and medium developed countries, which implies a necessity to improve the quality of this sector as well.

5 RESEARCH PRIORITIES

5.1 Scientific Community Research priorities (R&D priorities)

The main challenges of the Croatian research policy are defined in the Science and Technology Policy of the Republic of Croatia 2006-2010, accepted by the Croatian government in June 2006. They reflect the country's main strategic goals of integrating the Lisbon and Barcelona targets into national development plans and creating a knowledge-based society.

The main research and development priorities are to increase investment in this area, to increase the efficiency of research in agro-food sector, to strengthen the cooperation with other scientists and institutions and to include Croatian agro-food researchers in European and other international research projects. Also, one of the priorities is to strengthen the research infrastructure and to invest in human potentials in this research area.

The priorities in R&D are agreed between different stakeholders in this sector, mainly through the activities of Government ministries in charge of this area and National Councils, such as National Council for Agriculture and National Council for competitiveness. There is also a Council for Research in Agriculture that funds relevant research and sets priorities for agro-food sector.

These priorities and foresight are driven by general national development policy and tries to be in-line with other priorities set by the state agencies and ministries.

5.2 Agri food sector Research priorities

From different plans and strategies, short-, medium- and long term priorities and different tenders for research projects we compiled the major research priorities of agri-food sector in Croatia.

In general, competitiveness of agribusiness sector, namely family farms competitiveness is one of priorities. Rural development is also priorities which are rather expected due to the policy switch from agricultural toward rural policy. Environmental protection and climate change are among priorities too.

In order to fulfill mentioned priorities following research objectives could be listed:

Modernization of agricultural production in order to achieve existing quality standard. Very often it is way to raise productivity (yields) from current (low level) to EU level. This objective also includes orientation toward organic agriculture. Issues of food safety and quality assurances are very important.

Role of social sciences are very important and therefore researches in the field of agricultural economics and rural sociology are between goals. Although social dimension of agri-food research will share some priorities like ones in EU, it should and most likely will have some different priorities due to consequences of transition and privatisation processes, agricultural structure and underdeveloped farm business monitoring data bases, underdeveloped market system and underdeveloped rural finance system to mention just a few.

Research priorities, in general, take care of regional differences: Pannonian, Mediterranean and Mountain area.

In order to support preceding lines we shall present some facts.

Council for Research in Agriculture (ARC)³ in its regular annual tender for applied research projects in agriculture put following priorities:

1. Development and income and employment diversification on family farms in the function of rural development
2. Increase family farms' competitiveness through innovation and new technologies
3. Influence of agro-ecology, economy and social conditions on the expansion of agriculture.
4. Organic agriculture

In the period 1998-2004 ARC projects have encompassed following biotechnology fields: crop production (46 projects), horticulture (35 projects), family farms (45 projects) and organic production (27 projects). As the result of considerable problems with drought in the last years, irrigation was among priorities too. Other fields like livestock production, genetics, food technology, fishery and legislation had a less significant share in ARC's projects. In financial terms amount invested in the period 1998 to 2007 was 52.7 million Kunas (or about

³ Institutions mentioned in this chapter are described in more details in the next chapters.

7 million Euro). Beside ARC, Ministry of agriculture finance different development projects. In that portfolio projects in the field of fisheries, livestock production and vegetable productions prevails.

6 SUPPORT MECHANISM FOR RESEARCH IN THE AGRIFOOD SECTOR

6.1 Funding Programs at National level

Scientific research, technical and development projects concerning the needs of villages and agriculture are financed owing to several sources: finances of the Ministry of Science and Technology, Ministry of Agriculture, Fisheries and Rural Development (MAFRD) through the Council for Research in Agriculture (ARC) and the Ministry of the Economy, Labour and Entrepreneurship. An important step forward towards the development of research has been made by the Ministry of the Economy, Labour and Entrepreneurship, which implements the programmes “Croatian Innovation and Technology Development – HITRA” and “Development of Knowledge-based Enterprises”.). The ARC research is financed by the MAFRD through the Fund for Applied Research Development in Agriculture. This programme has the advantage of being connected with the CAEI, which conducts the process of applying the results of the research in practice. The Ministry of the Economy, Labour and Entrepreneurship also supports the so called “New Technologies Programme” and programmes and projects regarding cooperatives. Furthermore, smaller projects are financed from various sources, such as the Croatian Government Office for Associations, county and local authorities, foreign donations of international associations, companies, banks and so forth. Beside high institutes and universities, the research activities are also conducted by (regional) public institutes. The evaluation process for research projects, however, is in most cases too long and scarcely transparent. The obligation of commercialisation of applied research in agriculture is poorly enforced, which makes the impact assessment very difficult, while the investments do not pay.

6.2 National support to agriculture policy

The legal basis for the allocation of the state aid in agriculture includes various provisions and their financing is determined by the state budget and local budgets of the regional (counties) and local (municipality and cities) self-governments. The Croatian Government does not have the legal basis for monitoring aid to agriculture financed from local budgets. The majority of the national agricultural policy is implemented through two Acts – the Agriculture Act and the Act on the State Aid in Agriculture, Fisheries and Forestry. MAFRD is the body responsible for their implementation. The Agriculture Act (OG, 66/01, 83/02) is the umbrella act that governs the overall field of agriculture by incorporating the existing legislation and areas that have not yet been directly regulated. The Act sets out the objectives and measures of agricultural policy, defines beneficiaries, institutional aid, agricultural policy makers, monitoring and reporting in agriculture as well as administrative and inspection control.

The Act on State Aid in Agriculture, Fisheries and Forestry (OG, 87/02, 117/03, 82/04, 12/05, 85/06, 141/06) provides for four different state aid schemes intended for different target groups or aid beneficiaries. The schemes are:

1. the production subsidy scheme (direct payments)
2. the income support scheme,
3. the capital investment scheme and
4. the rural development scheme.

MAFRD is also responsible for the allocation of state aid for certain programmes based on secured funds in the state budget and special decisions of the minister. Special agencies of the Croatian Government (Croatian Bank for Reconstruction and Development - CBRD, Croatian Agency for Small Business - CASB) allocate aid to the economy in general, therefore including agriculture, under special programmes in accordance with the several horizontal regulations (Investment Support Act, Act on State Support for Small Entrepreneurship, Islands Act, Act on Areas of Special State Concern, Act on Mountainous Areas, Regional Development Fund Act). It concerns crediting infrastructure and economic projects and the issuance of guarantees. There are also specific programmes adopted by the Croatian Government (beef, pigs, permanent crops, vegetables) and implemented by CBRD and CASB. These programs consist of financing investments through loans with interest rates lower than commercial ones. All aid to agriculture stemming from measures of the national

policy is financed from the state budget, which is adopted each year by the Croatian parliament.

Every year the MAFRD opens a tender with the purpose of collection of offers for awarding sponsorship and aid of the Ministry for holding of fairs, exhibitions, seminars, round tables, scientific gatherings, congresses and anniversaries with the purpose of promoting domestic products, connecting producers and improving agricultural production through transfer of knowledge. In 2006, 97 events were sponsored and granted a financial support in the total amount of 423.500 EUR (3.100.000 HRK).

6.3 EU Funding Programs and Pre-accession programmes

At the European Council Assembly on June 17th-18th, 2004, the Republic of Croatia became an official candidate country for the European Union membership. As a candidate country, Croatia has obtained access to pre-accession funds PHARE, ISPA and Sapard, including the financial and technical support for the adjustments necessary for full membership. In total € 245 million are available for Croatia through pre-accession funds, of which € 140 million are foreseen to be allocated in 2006 (PHARE - 80 million, ISPA – 35 million). Also the Sapard programme has started in 2006 and provides € 25 million. The EC has taken in September 2006 the decision to confer management of aid to the Sapard agency, which has marked the date on which the Sapard agency was allowed to select and contract Sapard projects.

From 2007 onwards “IPA - Instrument for pre-accession assistance for 2007-2013” will replace PHARE, ISPA, Sapard, and CARDS. IPA will contain five components: I) Transition Assistance and Institution Building, II) Cross-border cooperation, III) Regional Development, IV) Human Resources Development, V) Rural Development. The latter will replace Sapard and will be called IPARD (2007.).

The EU-CAP requires an institutional framework including e.g. a paying agency and the institutional capacity to implement the integrated administration and control system (IACS) and rural development measures. In February 2005 Croatia adopted the legal framework for the future paying agency consistent with EC requirements. The Department for Market and Structural Support operating within the Ministry of Agriculture, Forestry and Water Management will become together with the National Fund within the Ministry of Finance the paying agency in charge of CAP expenditure after accession.

Croatia complies with most of the EU requirements in the field of organic agriculture, as such it has the necessary register of organic operators, authorised testing laboratories, functioning inspection system, body able to take equivalency decisions if requested by importers of products from other countries and body able to take the general enforcement measures).

On January 1, 2006, Croatia became a full member of the European 6th Framework Program for Research and Technological Development, which provides the main framework for activities in the field of science, research, and innovation at the European level. Previously, Croatia did participate as a third country in this program ever since it had been launched in 2002, but due to a third-country status it had a limited access to applications .

According to the European Commission data, Croatia had signed 60 contracts co-financed by the European Commission (€5.8 million) by February 1, 2006. For the full participation of Croatia in the program, a total of €6.4 million were allocated – €3.18 million from the state budget and the rest from the PHARE-program budget for the Republic of Croatia. It is apparent that all our investments have so far been recouped. Since 60 contracts had been signed for projects applied for in 2005, before the official status of Croatia in FP6 changed, the total number of contracts is now expected to amount to 85-90, and the total amount received from the European Commission for these projects is expected to be €7 million by the end of 2006. The 7th Framework Program will be open from 2007 to 2013.

6.4 Bilateral funding programs and support measures

There are many bilateral co-operation programmes in the field of agro – food sector and rural development.

GTZ – Office for Economic Co-operation of the Republic of Germany

The German Government has approved EUR 1.5 million for the Programme *Incentives to economy and employment in the food sector*. Technical aid has been applied for the development of the Croatian small- and medium-sized enterprises dealing with food production and processing as well as with preparation of domestic products for the market.

EVD – The Dutch Government Agency

The EVD issues a tender for the “PSO business to business» programme twice per year. The bidders are Croatian entrepreneurs together with Dutch companies. The aim of this programme is to strengthen business cooperation between the two countries and transfer of knowledge and know-how. They will be used to subsidise various fields at institutional level.

Italian Act Nr. 84:

The aim of this Act is to support stabilisation, reconstruction and development of the South-Eastern European countries (the Balkans). It is financial aid of the Italian Government for encouragement of the Croatian economic development projects. The Ministry of Economy coordinates its implementation. The Ministry of Agriculture and Forestry, as a member of the task force, is responsible for giving a professional opinion and statements about Italian-Croatian projects to be proposed within the annual agricultural tender of the Italian Government. The Department will initiate cooperation between the Italian and Croatian companies on joint agricultural projects and will monitor the activities on their administration. One of the projects was ” Modernisation of fruit and vegetable production in the Balkans through sustainable production systems”. The project coordinator was the Agricultural Institute CIHEAM (Italy) and the CAEI (amount: EUR 2 million).

SIDA – Swedish International Development Agency

The project is aimed at consolidating agricultural land in order to establish a land consolidation system by establishment of the Agency for trade in agricultural land which is the precondition for modernisation of agricultural production.

Project for organisation and development of infrastructure for food quality and correctness. Its aim is to support non-governmental food organisations, laboratories and educational centres included in the matters of food-hygiene correctness (the project coordinator is the Ministry of Health with the MAFRD).

World bank projects

1. Economic and social reconstruction-beneficiary is Ministry of the Sea, Tourism, Transport and Development. The economic and social reconstruction project includes economic and social revitalisation of war-affected areas and accomplishment of the social incorporation of the population. The total budget of investment is 35 million EUR which will be invested in several projects proposed by local communities.
2. Croatia Real Estate Registration and Cadastre Project- beneficiary : Ministry of Justice

The objective of the project is to build an efficient land administration system with the purpose of contributing to the development of efficient real-estate markets. This will be achieved by addressing aspects of the supporting infrastructure, especially the real-estate registration system in the municipal courts, the cadastre system that is operated by the State Geodetic Administration (SGA) at the regional and branch office levels and by the Zagreb City Cadastre Office, supported by the academic institutions and the private-sector support professionals. Closing date is September 30, 2008. The budget is 26 million EUR.

7 SWOT ANALYSIS

7.1 Methodology

In order to make a SWOT analysis for the agro-food sector in Croatia, it was necessary to conduct a number of interviews with experts from this field. Their opinions along with previous research served as a basis for the construction of SWOT matrix.

Five experts from science and three managers in agro-food sector were interviewed. Their task was to assess strengths, weaknesses, opportunities and threats for Croatian agri-food sector.

The answers were analyzed by compiling the most frequently mentioned strengths, weaknesses, opportunities and threats and the answers mentioned by only one expert were disregarded as unimportant. During the interviews, the experts had to explain each point and provide reasons why they think a certain point is strength, weakness, opportunity or a threat. If possible, their answers were related to existing data or scientific literature that backs up their assertions.

Besides experts' answers, the SWOT analysis included also a review of previous research in this area available in the literature.

SWOT chart is present in the next chapter and it is divided in two sections – **science and industry** in the agri-food sector.

7.2 SWOT chart presentation

Table 9 SWOT chart for Croatian agri-food sector

Strengths (S)	Weaknesses (W)
<u>SCIENCE nije u skladu sa većim dijelom teksta</u> 1. high number of education institutions and centers 2. highly qualified staff (scientists) 3. R&D programs and strategies 4. Involvement in international projects 5. Existing support centers for the development of the sector	<u>SCIENCE</u> 1. inadequate programs of agro-food education 2. underdeveloped sector of adult education 3. low investment in educational infrastructure 4. low number of available experts 5. low networking of institutions
<u>INDUSTRY</u> 1. favourable production conditions (climate)	<u>INDUSTRY</u> 1. low competitiveness of small scale

<ol style="list-style-type: none"> 2. production technology in some areas 3. modern small scale food industries 4. highly developed tourist market 	<p>producers</p> <ol style="list-style-type: none"> 2. low compliance with EU safety and quality standards 3. insufficient organisation of production? 4. negative trade balance in the sector 5. undeveloped distribution channels
Opportunities (O)	Threats (T)
<p><u>SCIENCE</u></p> <ol style="list-style-type: none"> 1. improvement of agri-food education 2. better cooperation of science and industry 3. higher involvement in European research area <p><u>INDUSTRY</u></p> <ol style="list-style-type: none"> 1. better organisation of producers 2. modernisation of SMEs 3. adopting EU food safety standards 4. agro-tourism 5. accession to EU – availability of EU funds 6. establishment of private consultancy services 7. improvement of networking between producers, industries, research centres 	<p><u>SCIENCE</u></p> <ol style="list-style-type: none"> 1. low priority of the sector in scientific community 2. limited financial resources for research 3. slow process of changes in the scientific research <p><u>INDUSTRY</u></p> <ol style="list-style-type: none"> 1. increased competition resulting from EU accession 2. low investments in modernisation and infrastructure 3. limited sources of financing

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