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Agribusiness higher education development – training needs analysis¹

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Abbreviations used in the report:

AHEAD	Agribusiness Higher Education Development
MBA	Master of Business Administration
MSES	Ministry of Science, Education and Sports
MAFW	Ministry of Agriculture, Forestry and Water Management
CD JEP	Curricula Development Joint European Project
BOKU	Boden Kultur

Introduction

With the tremendous changes in political and economic systems of the Republic of Croatia after independence, new challenges have been put to the higher education system as well. The system used to be structured to serve a centrally planned economy with predominantly state ownership. Universities were producing graduates to be employed on state farms, in agri-food systems (so called „kombinats“), the state owned processing industry or cooperatives. The graduates were specialised in particular branches, such as crop production, vegetable production or livestock husbandry. Therefore, they were not educated to understand the whole system of a company or the agri-food system. In one word, they were not prepared to run firms as managers, although they were highly educated. Small and medium size entrepreneurs in agri-food business have been rather an

¹Final Report Tempus CD JEP 19009–2004

exception than a rule, and prior to the transition there was not to much experience in managing, financing or marketing for such a firms.

Processes of privatisation and market liberation brought a huge challenge to the agri-business sector in Croatia. Both food production firms and farms were forced to face markets directly and to compete with increasing foreign competition. Family farms found themselves in an especially problematic situation, since they have been used only to production, while the distribution system was owned and run by state firms. Even more severe conditions rose when the distribution system collapsed, which happened together with the collapse of vertical integration run by „kombinats“.

Consequently, the education system has had to change the way it introduces trainings in management and marketing for small and medium entrepreneurs and agribusiness professionals, because their functions are not even suitable for the new situation. Indeed, they practically disappeared together with state „kombinats“ and cooperatives.

In the mid-Nineties, the Faculty of Agriculture of the University of Zagreb carried out the first big reform of study programs in answer to the new circumstances. The former eight specialised graduate study programs were reorganised into two general study programs in plant science and animal science. Each of the two study programs lasts for 9 semesters, and majors are introduced in the fifth semester. There were seven majors in plant science and three majors in animal science. Agricultural economics, which was the closest major to agribusiness management, has been a part of the plant science study programme.

With the acceptance and introduction of the Bologna process by Croatian higher education authorities, a new reform has begun at all universities and high schools. The Faculty of the Agriculture University of Zagreb started to work on the reform in cooperation with EU universities, especially University of Hohenheim and BOKU University in Vienna. The three universities started a Tempus project in 2003, with the objective to develop new modern curricula for agricultural faculties in Croatia². It has been agreed through the project that developing agri-food sector in Croatia needs professionals in management, finance and marketing that should be provided by high education. The Faculty of Agriculture has found it to be an opportunity to develop contemporary agri-business management study program. Subsequently, a new Tempus CD JEP project was established and approved by EU Commission in 2005: Agribusiness Higher Education Development – AHEAD. The overall goal of the project is to develop agribusiness education in Croatia, namely at the University of Zagreb. One of the basic tasks of the project team is to determine future demand for experts in the field of agribusiness and food science. To answer the task, an activity titled Training Needs Analysis has been introduced and carried out in the sector.

Training Needs Activity of the AHEAD Tempus CD JEP

Projection of future development of education is directly connected to projection of development of a sector in question. Therefore, it is necessary to investigate and gather information from all stakeholders about the future needs of a highly educated labour force. This is exactly what the Training Needs Analysis (TNA) outcome should bring to the AHEAD project: the future expert demand of the Croatian national economy in the field of agribusiness and food. The outcome consists of three activities:

1. Creation of the questionnaire, determination of the target group for the training needs analysis
2. Collecting, processing and evaluating data in connection with the analysis
3. Final report will be created, as the main result of the training needs analysis.

The TNA was mainly carried out between September 2005 and June 2006, while development of the final report took some more time and was finished at beginning of 2007. To get the best results, the TNA was accomplished in cooperation of all consortium members from Croatia, under supervision of the university staff from Zagreb and Debrecen. The final report about the TNA results was discussed among the consortium members and it is planned to be delivered to the target group. Data and conclusions of the final report will serve as a guideline for the university trainings trend and structure.

Detailed description of the activity as stated in the AHEAD project application³ is in annexes of this report.

Methodology

To achieve all the objectives set for the TNA outcome in the AHEAD project, a collection of methods and data sources has been applied and analysed. The collection can be broken down into the three main points:

1. field research based on a questionnaire: TNA survey
2. officials' and experts' opinion and
3. desktop research

Field research has been organised as a cross-sectional study based on multi-stage-cluster sampling method. Population was defined as all managers and experts reachable through the consortium partner network. All the branches in the agri-food sector were included and the partners approached the sample and they did the survey. Coordination work was done by University of Zagreb staff.

To get additional information about existing developments and strategies in the field of agri-business education, representatives of related institutions were consulted. Namely, the institutions involved are as follows:

²CD-JEP 17108-2002 Reform of Agricultural Studies in Croatia (RASC)

³Tempus Application Form, Joint European Project 2004, reg. num. JEP 19009–2004.

- University of Zagreb
- Faculty of Agriculture, University of Zagreb
- Faculty of Food Technology and Biotechnology
- Ministry of Agriculture, Forestry and Water Management
- Ministry of Science, Education and Sport
- and all the Consortium Partners' representatives.

Development measures under the TNA should be in accordance with national and sectoral education development strategies. For that reason, supplementary desktop research was done to check existing related studies, strategies and legal documents.

The TNA survey

The TNA field research has been organised as a cross-sectional study based on multi-stage-cluster sampling method. Population was defined as all managers and experts reachable through the Consortium Partners network. All the branches in agri-food sector were included and the partners approached the sample and they did the survey. Coordination work has been done by University of Zagreb staff.

Questionnaire

Aiming to get the most accurate information on perception of training needs among professionals and policy makers in agribusiness it was planned and necessary to conduct a structured enquiry. The enquiry survey is based on unified set of questions for all the participants prepared in form of questionnaire. The questionnaire was finally developed in two versions:

1. digital version to be distributed and filled up using PC and
2. hard copy (paper) version to be distributed by interviewer or by post, and filled up in hand writing.

Main reasoning in development of the questionnaire was to get a tool that will enable achievement of the TNA outcome objectives. The first draft has been developed at the Faculty of Agriculture, University of Zagreb, and it was partly based on the previous market research for new study programs done by the faculty staff. The first draft has been revised by the project management (University of Debrecen) and sent for revision to competent partners. As a result of the revision, it was decided that the questionnaire should be broadened and more detailed than it has been proposed in the first draft.

Final version of the questionnaire consists of four groups of questions, namely:

1. personal identification questions,
2. assessment of particular knowledge and skill for future education of experts in agribusiness,
3. assessment of demand for agribusiness professionals in short- and long-term perspective,

4. questions about the MBA study programme.

The questionnaire is a part of annexes to this report.

Personal identification questions

There are seven questions in the group of which five are closed and two open questions. The questions are about job, position, profession, education and mostly used skills in everyday work. In combination with other groups of questions, this should enable cross-tabulation analysis to get better insight into results according to different professional groups.

Assessment of importance of particular knowledge⁴ and skill

In this part of the questionnaire are offered sixteen different names of potential study programs. The programs are grouped in two sets:

- study programs in agri-food or a similar field (10) and
- study programs in economics or a similar field (6).

The second set has been added, since economics subjects seem to be more attractive to prospective students, even if offered at institutions that are not predominantly economic, but incline to teach applied economics. It is especially interesting, since agricultural education institutions in Croatia have been losing attractiveness in recent years. Therefore, it is worth looking for possibilities of development of new curricula more oriented to economics, but based on the tradition of agricultural economics education at the Faculty.

Before they start to assess knowledge and skills, respondents are asked to choose five the most attractive study programs for them out of sixteen. All questions in the second group relate only to those specific five programs. For every of the five potential programs sixteen different knowledge and four skills have to be assessed by importance on scale from 1 to 5 (giving higher value for higher importance).

Finally, 16 + 4 assessments per each of the five study programs will give 100 records for this group of questions if the procedure is followed.

Assessment of demand for agribusiness professionals

To get the most accurate and reliable forecast of future demand for professionals, a group of questions has been developed about possible places of employment and about number of experts needed in both, short term (2006–2009) and long term (2010–2014) perspective.

⁴The term knowledge is used here in sense of familiarity or conversance, as with a particular subject or branch of learning: *A knowledge of accounting was necessary for the job.*

The group of questions starts with estimation of number of employees needed per area of business and per each of the five study programs.

Next, questions are about how many graduates of chosen study programs are expected to be demanded in period 2006–2009 and in period 2010–2014.

Based on sufficiently large number of answers, this group of questions should provide acceptable forecast of future demand for graduates of specific study programs.

Questions about the MBA study programme

One of the most challenging activities of the Tempus project „AHEAD“ is development and implementation of internationally accredited professional MBA training at the Faculty of Agriculture in Zagreb. The MBA training should be integrated into the faculty regular program after the project is finished. Therefore, it is necessary to find out about opinion of professional society about need for specific training in management, finance and marketing as MBA training is.

Three questions are developed regarding the MBA training trying to find out (1) how much the training is needed, then (2) what are possibilities that firm will finance the training for its employees and, finally, (3) how many employees can be expected to be financed if acceptable for the employer.

Sample and data collection

As already mentioned, the TNA enquire has been organised as a cross-sectional study based on multi-stage-cluster sampling method. Sample size was 400 managers and experts from all parts of Croatia, in the field of agriculture, food industry, agri-input industry related institutions and public administration. It was an intentional sample approached by the project consortium partners which prepared sample frame based on their contact list or member list.

Data collection started in December 2005 and finished by February 2006. Two ways of data collection were applied:

- data collection by e-mail using digital version of the questionnaire,
- data collection by surface mail using paper version of the questionnaire.

All together 434 questionnaires were collected and analysed. The questionnaires were first collected by the Consortium Partners and then sent to the Faculty of Agriculture for revision and data input.

Review of existing development strategies

Education Sector Development Plan 2005–2010, Ministry of Science, Education and Sports (MSES), 2005

In the Education Sector Development Plan for the period 2005–2010, the MSES of Croatia gave a thorough descrip-

tion of trends and situation in the national economy and education. Priorities are defined in the four topics given here:

- Improving the Quality and Efficiency of Education
- Supporting the Continuing Professional Development of Teachers and Other Education Personnel
- Developing Management Strategies for an Efficient Educational System
- Education for Social Cohesion and Economic Growth and Development

The priorities have to bring the system towards „Targets for Croatian educational development“. The targets are set for four levels of education as follows:

- Pre-school and Primary Education
- Secondary Education
- Higher Education
- Adult Education and Training

Concerning higher education, the main targets in the programming period are connected to the adjustment of Croatian education system to the Bologna declaration and to the EU educational system.

Regarding to number of graduates, it is projected that the number should increase by 30% by 2010. There is no analysis of relation between this number and potential demand for graduates in the economy. However, it is presumed in the plan that there are not enough highly educated people in Croatia, and that even more will be needed. The plan deals with education on macro level and, therefore, there is no projection of specific sector as agri-business is.

Self-evaluation Report (Preparation and implementation of Bologna Process), University of Zagreb, 2005

According to the report, there were 55,224 students at the University of Zagreb (UZ) in 2005, of which 3,227 were in biotechnology. Total number of postgraduate students was 6,196, while the total number of full-time staff was 6,800. The university had a budget of 233,33 million EURO in 2004.

The majority of the report is dedicated to problems of implementation of the Bologna declaration and new lump-sum system of financing universities in Croatia that has to be introduced. Additionally, questions of quality assurance and transition problems related to internationalisation and ECTS system are addressed. Although the report suggests the UZ is going in the right direction and that it will successfully implement all the necessary adjustments, it says nothing about the position of the UZ regarding demand for its graduates.

Policy Recommendations For Raising Croatia's Competitiveness, National Competitiveness Council, 2004

As an advisory body that brings together representatives of business, government, unions, science and education, the National Competitiveness Council issued recommendations for increasing Croatia's competitiveness in 2004. The document was developed by numerous collaborators organised in expert groups by field of expertise. One of the groups was working under title Education For Growth And Development. The group came out with three conclusions about present situation:

- insufficient public expenditure for education (only 4% of the GDP)
- low educational attainment of the workforce compared to European countries (only 7.1% of the workforce holds a two year college degree, and 12.3% hold an undergraduate degree or higher) and
- absence of an estimate of future skills needs.

With intention to increase competitiveness, authors gave dozen of recommendations of which following can be related to the Training Needs Analysis and the AHEAD project reasoning:

- Increase participation in adult education
- Estimate the labor market's future skills needs
- Adjust educational programs to the development of knowledge and
- skills needed in the future
- Improve the system of higher education
- Modernize teacher education ("teach the teachers")
- Increase the role of the private sector in the provision of educational
- services
- Increase public expenditure for education

It is obvious that the TNA is in line with these recommendations and it can be considered as necessary step towards improvement in agribusiness education.

Assessment Of The Labour Market And The Vocational Education And Training Sector In Croatia, European Training Foundation, 2001

In 2001, the European Training Foundation conducted a research in Croatia to assess relations between the labour market and vocational education sector. In general, many of the recommendations from this document can be applied to higher education and labour market as well. It is stressed that a new changing environment emerged after overall transition of the country asks for new knowledge and skill at all levels: from recipients of knowledge, through educators to education policy makers. Recommendations are summarised in for points and we shall mention it in short.

First, they say, governance and system should change, where more coherent policy, flexible lifelong learning system, information and partnership should serve as key stones in development. Secondly, decentralisation and better perform in finance should be enforced. Third, teachers and school managers are obliged to educate themselves constantly to be able to answer all the requirements of modern education. Finally, curricula should be designed bearing in mind lifelong learning, integration of work and learning and stimulation of entrepreneurship.

Explanation of the need for a higher education reform, Ministry of Science and Technology, 2004

In the period of preparation and introduction of current Act on Institutions of Higher Education in Croatia, the Ministry of Science, Education and Sport worked out a document to support proposed changes. Among many other, there is also mentioned aim of the Act under title

„Establishing closer links between the economy and education“. It is said that „The analyses of the existing conditions in the field of higher education show relatively good results in the theoretical part of education, but very little or no applicability of the acquired knowledge.“ For that reason, educational institutions will be recommended to improve connections with economy. Changes in system of financing will also force institutions to look for alternative sources, and that certainly means better understanding of economy and labour market demand. Only attractive studies that ensure employment will be interesting for future students cause they will have to pay a great deal of their costs of study.

Higher education system in Croatia

The system of higher education in Croatia is under jurisdiction of the MSES. Education can be organised at universities and other higher education institutions as can be seen in the chart bellow. There are two bodies responsible for these two groups of institutions:

1. Rectors' Conference which administers universities and
2. Council of Polytechnics and Schools of Professional Higher Education

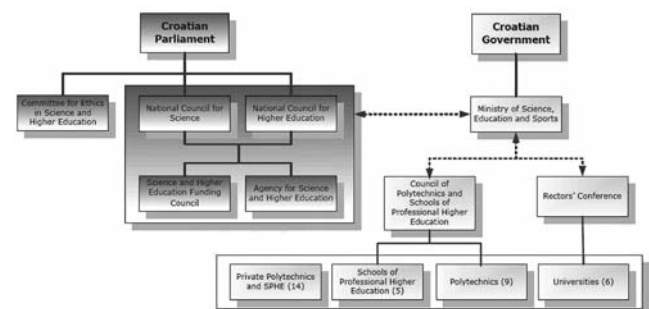


Figure 1: Higher education system in Croatia
(Source: The Croatian Ministry of science, education and Sports)

The system is further subordinated to national bodies for science and education. The national councils and the agency have licensing, coordinating and controlling role at state level.

Based on this hierarchy, two types of higher education exist in Croatia: (1) university education and (2) professional education. There are possibilities of transfers from one type to another after undergraduate level and it is also allowed for universities to organise professional studies.

With implementation of the Bologna Declaration, we can say that the whole system functions using ECTS points and it is theoretically possible to trace students' achievements through the process. There is still not much expertise on transfer from undergraduate to graduate programmes since the first „Bologna generations“ did not finish the undergraduate phase.

On Figure 2, one can see that the cycle of higher education can last from a minimum 2 years (undergraduate professional) to a maximum 8 years (post-graduate university).

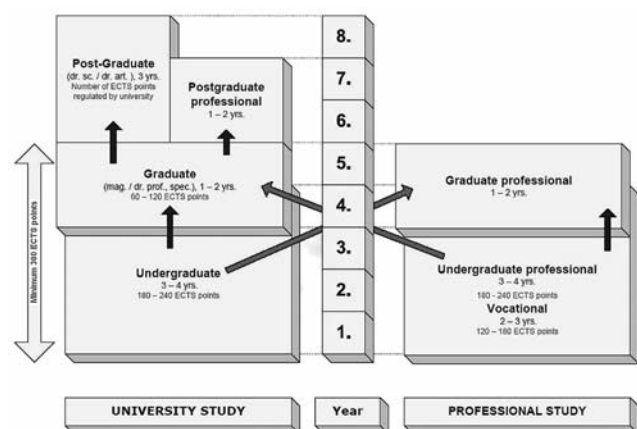


Figure 2: The scheme of higher education studies in Croatia
Source: The Croatian Ministry of science, education and Sports.

Table 1: Institutions, students and teachers in tertiary education in academic year 2004/2005 in Croatia

Tertiary education	Number in 2004/2005
Number of institutions	103
Number of educators	8,764
Number of students:	134,986
Undergraduate study	128,670
Master's degrees and doctorates	6,316

Source: As stated in the publication Educational System In The Republic Of Croatia, Croatian Chamber of Economy Business Education Centre, 2006.

Altogether, there are some more than 100 higher education institutions in Croatia⁵. Number of students involved is roughly 135.000 of which 6.500 postgraduate students. There is an increasing trend of number of student at polytechnic higher education institutions which fuels growth of total number of students, as well.

Education and unemployment

After 2002, when the vttotal number of unemployed reached a maximum value of almost 390 thousand, it began steadily decreasing. In the last few years, the unemployment rate has not been much lower than 19%⁶. It is of greater concern to this report that the trend of unemployment of active persons with higher education fluctuates more. In the periods of high total unemployment, there growth in number of unemployed higher educated persons is higher.

Undoubtedly, the conclusion can be drawn that an economy in decline usually keeps cheap uneducated labour. In that sense, educated labour is appreciated on the labour market. In other words, the product of higher education costs more than employers can benefit from.

Additional proof can be found when comparing number of graduated students and number of unemployed persons.

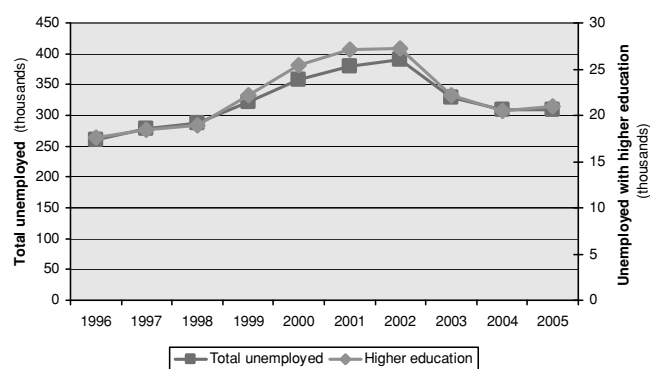


Figure 3: Average number of unemployed persons, by professional attainment

From Figure 4 one can see that constant growth in number of students possibly caused rise in unemployment of this segment. It can be a poor connection and adjustment between higher education and the economy that produces such a development.

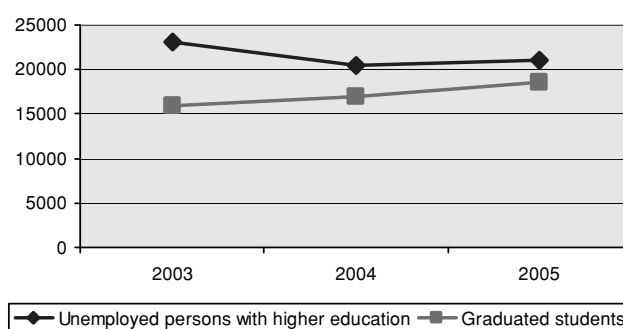


Figure 4: Unemployed persons with higher education and number of graduates in Croatia

Unemployment trends in agriculture, hunting and forestry give one more reason to reconsider higher education in agribusiness. During the period 1999–2003, the number of unemployed in agriculture was increasing faster and decreasing slower than the total unemployed.

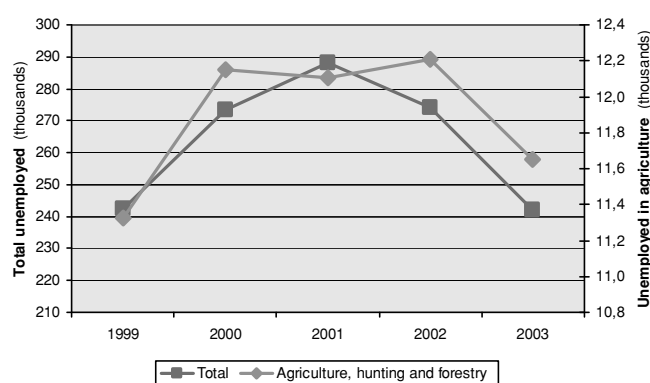


Figure 5: Unemployed persons in agriculture, hunting and forestry, situation as on 31 December

⁵Source: Educational System In The Republic Of Croatia, Croatian Chamber Of Economy Business Education Centre, 2006.

⁶The registered unemployment rate is calculated as a ratio of unemployed persons and total active population (labour force).

Based on the trends described above, the higher education and especially in agribusiness, has to introduce changes to take into account labour market demand and changes in the agricultural sector. It is obvious that agribusiness education has to shift from pure agriculture to provide employment for its graduates.

Finally, data on number of highly educated population are not satisfactory if Croatia is to give rise to its competitiveness. Less than 20,000 graduated students per year cannot promise structural changes in the labour force. It is for sure that a competitive high-tech society asks for a higher share of educated in the population.

Institutional infrastructure

Ministry of Science, Technology and Sports

Croatian higher education is under the jurisdiction of the Ministry of Science, Technology and Sports (MSES). The Ministry is responsible for the whole education system, from the pre-school to postgraduate programs, as well as for lifelong learning. Also under the Ministry is the scientific and research institutions system. Public funding for these activities goes through the Ministry and is then distributed to the institutions for either educational or scientific programs. Although some efforts have been taken in that direction, universities in Croatia still do not have complete supervision of their member institutions (faculties, institutes). It is to say that the system of distribution of resources below university level is still under construction and the faculties are fairly independent. In such circumstances where responsibilities and authorities are not clearly appointed, it is not easy to implement development strategies in the field.

Regarding research done about educational needs, at the ministry they have a more general approach and there is no precise forecast of demand for specific sectors of the economy. The studies done show there is need for a lot of changes and improvements and especially in regard to:

- increase of number of graduates, i.e. highly educated people
- improvement of the quality and efficiency of education
- continuing professional development of educational personnel.

The ministry encourages and asks higher educational institutions to adjust their curricula to specific need of related sectors, although it can not help much with exact data. Therefore, the institutions have to look for their own resources to investigate a specific market.

Ministry of Agriculture, forestry and water management

It is declared in the Act on Agriculture that the Ministry of Agriculture, Forestry and Water Management is in charge for structural agricultural policy measures as well (art. 15 of the act). These measures should contribute to competitive-

ness of agriculture and increase of farmers' income. Among other things, the measures encompass professional education and training for agriculture. The ministry has to contribute to continuous education and training of farmers and one of the most important roles in the process is that of the Croatian Extension Institute. Based on available information gathered from the ministry officials, exact information about educational needs in agriculture and agribusiness in general are missing. They do not have estimates of the number of highly educated professionals in their field for future period.

However, they can see that people from agribusiness are looking for a „new“ type of agricultural specialist, which are knowledgeable not only about agricultural technology, but in, i.e. management, marketing. The ministry is in favour of any move towards adjustment of education in that direction, especially in the context of Croatian accession to the European Union, where these skills are highly valued.

University of Zagreb

In recent years all the universities in Croatia struggle to meet requirements put into effect with introduction of Bologna Declaration. The period can be called the period of reform because the system used to be totally different regarding to types and levels of study programs. At the University of Zagreb most of the member units (faculties) introduced new system of 3+2 years of graduate programs in 2005. The faculties got licensed hundreds of new curricula and started to implement it with academic year 2005/2006.

In the same time, in accordance to the development strategy of the MSTs and the Rectors' Conference, should start the process of enhancement of the education system's efficiency and of strengthening the role of the universities in the system. Until now, only modest steps have been made in that direction. Quality assurance system is under development and system of financing is not yet completely defined.

The university leadership is preoccupied with the reform and its consequences. There have not been done thorough research about the labour market, even in connection to the newly introduced curricula. If the new lump-sum system of financing will be introduced soon, the university will have to look for possibilities to cut costs and its units will have to look for alternative sources of financing. Most probably, they will have to put forward attractive programs, programs adjusted to the market needs.

Faculty of Agriculture University of Zagreb

At the Faculty of Agriculture in Zagreb (FAZ) recent reform of higher education system has been taken very seriously. Knowing that interest for agricultural studies is dropping, at the faculty they changed from previous two 9 semester programs to 9 undergraduate 3 years programs and 13 graduate 2 years programs.

A research has been done among professionals about interest in different courses before the new programs were introduced. Based also on that research, more specialised

programs have been designed and developed. The interviewers' answers showed that more specialised graduates are needed and that among the most attractive programs are those with attractive titles like ecology, marketing, management, environment protection, tourism etc.

Not too many effort has been done regarding to neither market size assessment nor market positioning. The faculty leadership is interested in giving more independence to particular study programs, but also in asking for more financial discipline and for higher education quality.

Main findings of the field research

It is already mentioned under the Section 2.1 that the field research was designed as survey based on the questionnaire on sample of more than 400 agribusiness professionals. Based on data collected from 434 interviewees, here are the main findings of the research.

Description of the sample

In the first part of the questionnaire the interviewees were asked about their job and position (see Table 2, part a)). Regarding to employment according to ownership, most of the respondents work in private or cooperative firms and they make more than a half of the sample (56.7%). The next biggest group are professionals from state or public firms with share of 28.6%. Here are included government and local government offices, research and education institutions and alike. Some more than 11% of the respondents are self-employed while 3.4% go to *other* types or *missing* group. The expert opinion is that the sample structure is in accordance with real employment structure of the economy.

From the second part of the table it can be seen that most of the respondents work as management or consultants that indicates their competence to answer the questionnaire and to give sufficiently good forecasts. More than 77% of interviewees are in this category, while other are pretty equally distributed in three groups: entrepreneurs, educators and other.

The most various answers are given to question about profession. All the answers were sorted and grouped in 9 bigger groups (frequency higher than 5) and 1 group for other professions. Agricultural profession is prevailing one with 43%, which is reasonable for research in agri-business. Second biggest group are economists (23%), as the most common profession among managers. Then follow food and biotechnology professions with the share above 10% while all other professions are not so common.

Knowledge and skills needed

To get the most correct information about knowledge and skills that people need when work as professionals in agribusiness, respondents were asked to write down maximum five skills or knowledge that:

Table 2: Frequency tables for the main attributes of the sample

a) Employment (or job) type		
Description	Frequency	Percentage
Private or cooperative	246	56.7
State or public	124	28.6
Self-employment	49	11.3
Other types	11	2.5
Missing	4	0.9
Total	434	100.0
b) Position of interviewee in the firm		
Description	Frequency	Percentage
Management or consultant	335	77.2
Entrepreneur (SME)	35	8.1
Other	32	7.4
Educator	27	6.2
Missing	5	1.2
Total	434	100.0
c) Profession (the highest level achieved)		
Description	Frequency	Percentage
Agriculture	186	42.9
Economics&management	100	23.0
Food&biotechnology	45	10.4
Mechanics&technics	19	4.4
Other	17	3.9
Veterinary	14	3.2
Biology&chemistry	11	2.5
Agrieconomics	10	2.3
Tourism	8	1.8
Law	5	1.2
Missing	19	4.4
Total	434	100.0

- they use in everyday job and
- they were missing mostly when started to work.

In the Table 3 are the 10 most repeated writings for both groups. Comparing the lists from two sides of the Table one can see that some of the listed items are really needed and have to be considered as a part of education process. Knowledge which is the most used was as a rule also the most missing at the beginning of employment.

Moreover, it is easy to see that organisation, marketing and management are indispensable knowledge and PC skills together with foreign language are essential skills for agribusiness managers.

The results can also have another meaning: education process is satisfactory given it provides professional knowledge (agriculture, food and technology and alike) and it has to be improved to provide additional skills. Furthermore, taking into consideration the list above, there is a wide space for lifelong learning programs in the sector.

Evaluation of potential study programs and courses

Second part of the questionnaire consists of questions regarding to attractiveness of different possible study programs in agribusiness and to importance of different

Table 3: Knowledge and skills used and missed by respondents (Top ten items by frequency)

Knowledge and skills needed in everyday job	Frequency*	Knowledge and skills missing when started employment	Frequency
organisational skills	128	PC skills	116
PC skills	110	management skills	91
management skills	109	law/legislation	67
foreign languages	86	foreign languages	66
knowledge of legislation	81	practical experience	33
communication	75	marketing	23
informatics	53	production technology	22
production technology	50	practical knowledge	22
agricultural technology	49	organisational skills	20
marketing	42	human resource management	20

* Frequency counts occurrence of specific knowledge or skill in the questionnaire.

knowledge and skills regarding to specific study programme. Interviewees were offered 16 study programs under possible titles divided in two groups as follows:

A. Study programs in the area of agriculture and related sciences:

1. Agricultural economics
2. Agribusiness and rural development
3. Agri-food technology
4. Zoo-technology (Animal breeding)
5. Forestry and game management
6. Agronomy and horticulture
7. Environmental and natural resource mgmt.
8. Rural development
9. Public administration in agriculture
10. Food quality and safety

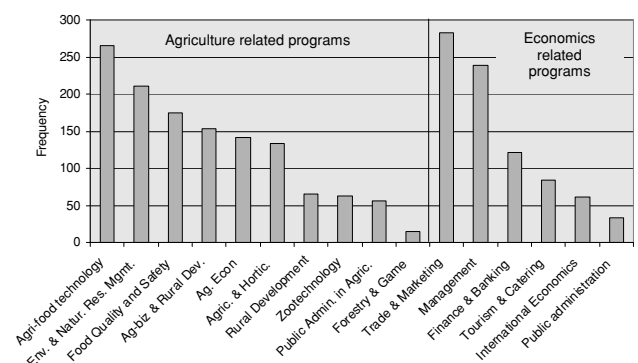
B. Study programs in the area of economic sciences:

11. Tourism and catering
12. Management studies
13. Trade and marketing
14. Public administration
15. International economy
16. Finance and banking

They have had to make choice of 5 the most attractive programs, and then to answer a set of questions concerning the choice. Answering the questions, respondents evaluated importance of specific knowledge for particular study, then they graded possibilities of employment of graduates in different sectors and finally they forecasted the number of graduates needed in short-term and long-term period.

The chart on the next page shows frequencies of selection per study programme (see Figure 1).

It is apparent that four courses dominate the set: (1) agri-food technology, (2) trade and marketing, (3) management and (4) environmental and natural resource management. All four of them have frequencies above 200 and are the most attractive programs from the list. The least attractive are forestry and game, public administration (in both of the groups), zoo-technology and rural development. The respondents showed an inclination towards food and environment related programs as well as towards business (or economics) related programs.

**Figure 6:** Frequency of choice of the potential study programs

Distribution of frequencies is not different if we compare respondents by educational level, but there are some disparities by occupation. The group of educators shows more equally distributed frequencies than two other groups of entrepreneurs as well as managers and consultants. Therefore, one can conclude that there are differences between educational personnel and the professional regarding favourable study programs. Latter ones are more focused on specific fields.

Differences are also found in distribution of frequencies between state and public employees compared to employees of private or cooperative sector. Former ones showed more equally distributed frequencies.

As already has been mentioned, respondents had to grade several types of knowledge for each study program chosen. If all the grades are summarised regardless the program chosen, the highest average grade has been given to knowledge about management and entrepreneurship as well as about project management (see Table 4).

For the same knowledge standard deviation is the lowest that revealing there are small differences in grades among the respondents.

The ranking has been done for each study program as well (see Table 5). Knowledge of *project management* has got the highest mark for 7 programs and knowledge of *management and entrepreneurship* for 5. Furthermore, *management and entrepreneurship* is among the top five

Table 4: Average grades per knowledge - summarised

Knowledge	N	Mean	Median	Min.	Max.	Std. Dev.
management and entrepreneurship	2004	4.28	5	1	5	.952
project management	1975	4.28	5	1	5	.951
business informatics and communic.	1975	4.22	4	1	5	.920
economics of production	1993	4.13	4	1	5	.992
ecology and natural res. manage.	2006	4.08	4	1	5	1.052
trade and marketing	1982	4.08	4	1	5	1.070
national and agric. policies of the EU	1980	4.00	4	1	5	1.102
food quality and safety systems	1932	3.89	4	1	5	1.189
financial manage. and banking	1936	3.67	4	1	5	1.203
national and trade law in the EU	1937	3.65	4	1	5	1.188
mathematics and statistics	1921	3.63	4	1	5	1.096
accounting and book-keeping	1953	3.55	4	1	5	1.175
rural sociology and rural devel.	1981	3.37	3	1	5	1.338
chemistry and biology	1915	3.25	3	1	5	1.491
public management systems	1955	3.25	3	1	5	1.155

knowledge for all the courses while *project management* is not for only one. Among the agri-food related knowledge, two with highest marks for most of the studies are *ecology and natural resource management* and *food quality and safety systems and standards*.

Regarding to business and economics related knowledge, highly rated are also knowledge of *business informatics and communications* and *trade and marketing*.

From the Table 5 it is possible to extract 5–6 subjects that will be attractive inside any given study program. Thus,

there are also sectors of *finance* and *agri-inputs*, while among the most unlikely there are *institutions* and *public administration sectors*.

There are some distinctions in marks per sector if we analyse it by types of study programs. The study programs are grouped in two groups:⁷

1. agri-business oriented programs and
2. business and economics oriented programs.

This breakdown shows that respondents made the distinction of the possible sector of employment in regard to

although the program has to be focused on specific topic, it is not complete and attractive enough without the highly rated subjects.

Likelihood of employment

After evaluation of importance of specific knowledge, respondents were asked to give marks for possible sectors of employment per distinct study programs. Mark 5 had to be given to the most promising sector for employment and mark one to the most unlikely sector. There were 11 sectors offered for scoring.

If all the study programs are put together, the highest average mark or possibility of employment is given to the *business services* sector. The lowest mark is given to the trade sector. Among the most promising

Table 5: The highest graded five knowledge by potential study programs (The programs are listed in alphabetical order)

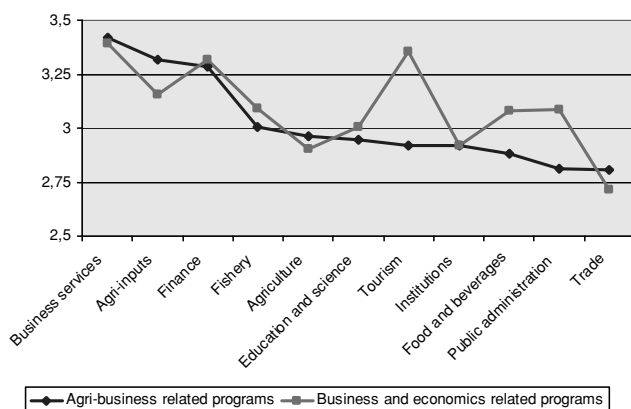
Study programs	1st	2nd	3rd	4th	5th
Agriecconomics	management and entrepreneurship	business informatics and communications	economics of production	trade and marketing	project management
Agribusiness and rural development	management and entrepreneurship	economics of production	project management	ecology and natural resources management	business informatics and communications
Agri-food engineer	economics of production	ecology and natural resources management	food quality and safety systems and standards	management and entrepreneurship	business informatics and communications
Zootechnology	food quality and safety systems and standards	ecology and natural resources management	economics of production	management and entrepreneurship	project management
Forestry and game management	project management	economics of production	management and entrepreneurship	ecology and natural resources management	business informatics and communications
Agronomy and horticulture	ecology and natural resources management	project management	management and entrepreneurship	economics of production	business informatics and communications
Environmental and natural resources mgmt.	project management	ecology and natural resources management	management and entrepreneurship	business informatics and communications	economics of production
Rural development	ecology and natural resources management	project management	business informatics and communications	national and agricultural policies of the EU	management and entrepreneurship
Public administration in agriculture	project management	business informatics and communications	economics of production	management and entrepreneurship	food quality and safety systems and standards
Food quality and safety	project management	ecology and natural resources management	business informatics and communications	management and entrepreneurship	economics of production
Tourism and catering	project management	ecology and natural resources management	management and entrepreneurship	business informatics and communications	food quality and safety systems and standards
Management studies	project management	management and entrepreneurship	business informatics and communications	trade and marketing	ecology and natural resources management
Trade and marketing	management and entrepreneurship	business informatics and communications	project management	trade and marketing	economics of production
Public administration	management and entrepreneurship	project management	business informatics and communications	trade and marketing	national and agricultural policies of the EU
International economy	project management	business informatics and communications	management and entrepreneurship	trade and marketing	financial management and banking
Finance and accounting	management and entrepreneurship	business informatics and communications	financial management and banking	project management	trade and marketing

⁷See the section 8.3.

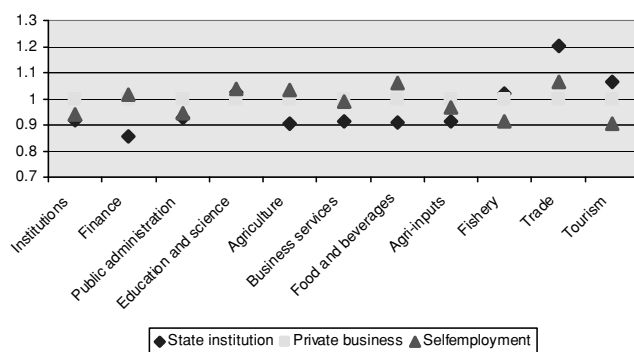
Table 6: Rank of economy sectors by possibility of employment (Maximum 5, minimum 1)

Sectors of economy	N	Mean	Min.	Max.	Std. Dev.
Business services	1252	3.38	1	5	1.209
Finance	1181	3.29	1	5	1.408
Agri-inputs	1185	3.26	1	5	1.158
Tourism	1183	3.09	1	5	1.453
Fishery	941	3.04	1	5	1.223
Education and science	1373	2.96	1	5	1.215
Food and beverages	1311	2.95	1	5	1.297
Agriculture	1321	2.94	1	5	1.327
Institutions	1442	2.93	1	5	1.310
Public administration	1342	2.91	1	5	1.150
Trade	1208	2.78	1	5	1.293
Valid N (listwise)	839				

the study program. Hence, they think that agri-input and agriculture sectors are less likely to employ graduates of business and economics oriented programs. On the other side, these graduates have more opportunity to get jobs in sectors like tourism, food and beverage industry and public administration sector (see the chart below).

**Figure 7:** Potential employment by sector and by study programs groups

From the next chart, one can observe differences in marks for potential employment per study program according to type of employment of the respondents. Differences are shown relative to respondents from private business companies (square markers, yellow colour).

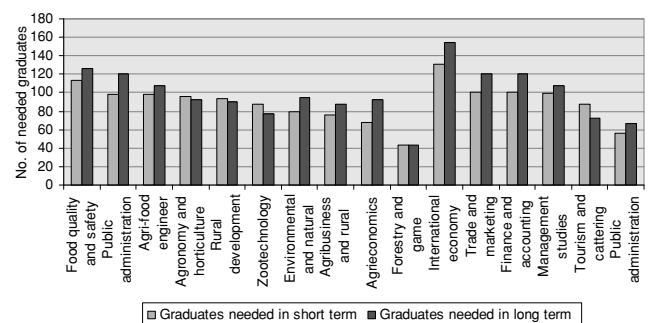
**Figure 8:** Potential employment by sector and by type of respondents' employment

In general, marks given by private business respondents and the self-employed are similar to those given by respondents from state institutions. The biggest difference is in marks for trading sector and finance sector where in the first case state (public) institutions employees gave much higher mark, and in the second much lower mark than workers from private business.

Forecasted demand of graduates

In most of only few studies done about labour market needs, there is missing any quantification of demand for highly educated experts. In the questionnaire used for this research, respondents were asked to predict yearly needs for graduates of different professions, i.e. different study programs. Predictions were asked for short period (2006–2010) and also for long period (2011–2014). Although the respondents found it hard to answer this question, the majority of them put some numbers in.

After all the extreme values have been deducted, an average number of graduates per study program was calculated. What is surprising, the highest demand is forecasted for the International Economy study program (131 graduates annually in short term and 155 in long term). Study programs related towards economics and business have higher averages in general.

**Figure 9:** Forecasted average short-term and long-term demand for graduates by the study programme

In the group of agri-business oriented studies, the highest number of needed graduates has been given to Food Quality and Safety (113 graduates annually in the short term and 126 in the long term). The second „most needed“ programme is Public Administration in Agriculture. It is interesting that for the „pure“ Public Administration in the economics group number of graduates is relatively low.

In order to help us understand the numbers better, in table 7 are numbers of graduates per year for period 2000–2003 in Croatia. In the table are included graduates of high schools and faculties that organise professional and university study programs.

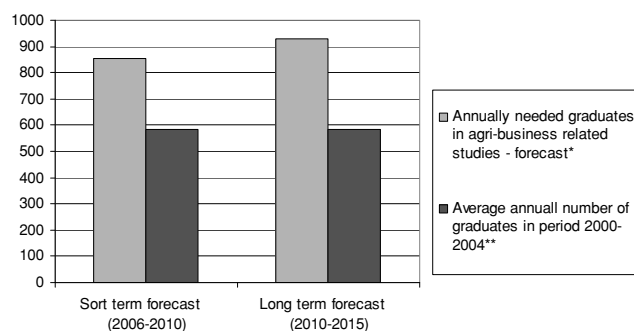
Table 7: Graduates at institutions of higher education in Croatia*

Scientific field and institution	2000	2001	2002	2003
Faculties of Food Technology and Biotechnology	188	140	169	162
Faculties of Agriculture	268	279	191	212
Faculty of Forestry	72	107	68	86
School of Prof. Higher Education in Agriculture	44	61	73	63
Faculty of Food Technology and Biotechnology	19	16	1	-
Faculties of Agriculture	39	26	35	26
Biotechnical sciences subtotal	630	629	537	549
Faculties of Economics	1,633	1,624	2,009	1,844
Faculty of Tourism and Foreign Trade	63	82	98	106
Faculty of Tourism and Hospitality Management	309	184	148	236
Faculty of Organization and Informatics	90	89	73	103
School of Prof. Higher Educ. in Tourism Manag.	-	-	-	73
American College of Management and Technology	-	190	245	226
Faculties of Economics	347	360	455	486
Faculty of Tourism and Foreign Trade	80	57	42	29
Faculty of Tourism and Hospitality Management	96	113	136	119
Faculty of Organization and Informatics	62	71	80	70
Social sciences and humanities - total	2,680	2,770	3,286	3,292
Total	3,940	4,028	4,360	4,390

* All the studies are included: professional and university.

It is apparent that the number of graduates increases, but the structure is changing in favour of social sciences and humanities. The trend can be explained by diminishing attractiveness of biotechnical studies, and the question is: can the trend be reversed? At least it can be slowed down by adjustment of programs to market needs.

However, results of the field research clearly show there is a need for higher number of graduates in biotechnological studies. If we summarize the average forecasted numbers of graduates needed for agri-business, the total number is higher than 800 per year. According to official statistics, the number of graduates in the field of biotechnology was not higher than 630 in the period of 2000-2004. Therefore, if the programs in the field of biotechnology were revised and adjusted, a higher number of graduates would be achieved. Furthermore, it looks like the agribusiness sector will be

**Figure 10:** Forecasted demand and existing number of graduates

* Based on the field research: sum of means per study programme.

** Based on the Central Bureaus of Statistics data: graduates in biotechnological sciences.

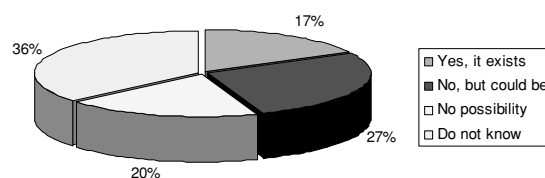
eager to swallow the increase in number.

This simple analysis results are in accordance with the stated aims of the Croatian economy and education authorities. It is a national strategic objective to improve the education structure of the population in general and especially of the active population. The objective can be reached only if number of graduates in higher education will rise.

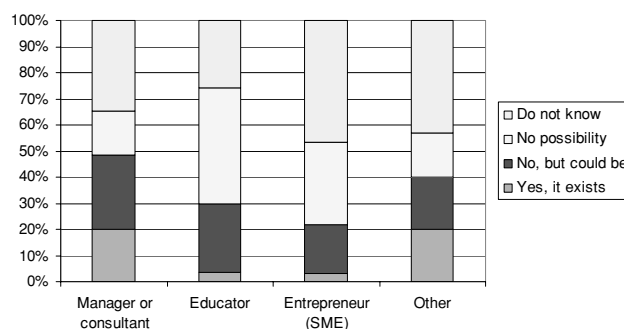
Possibilities of financing

In the final part of the questionnaire, the interviewees were asked to estimate the possibility for their firms to provide scholarships for future students. Altogether, 415 answers were collected and analysed. The structure shows that for 44% of respondents, a scholarship is an existing practice or at least a feasible possibility. However, we have to stress

again that the estimation was asked in regard to the listed potential studies and the possibility can be consumed if some of it will be established.

**Figure 11:** Possibility of the respondent's firm to finance future students N=415

To get a more useful and reliable result, the answers were cross-tabulated with information on the respondent's position. It is promising that in the group of managers and consultants the share of positive answers is the highest. Therefore, not only the possibility is estimated, but it is estimated by decision making persons.

**Figure 12:** Possibility of the respondent's firm to finance future students N=412

Demand for MBA education in agribusiness

One of the activities in the AHEAD project is setting up of international MBA study program. The program is intended to be a part of The International MBA In Agribusiness network and should offer management, marketing and other business related education for executives in the Croatian agribusiness. To check market for such a study programme, respondents were asked their opinion on:

- the existing need for MBA study programme
- the possibility of financing of potential students
- the probable number of students per year.

The majority of the respondents, more than 60% of them, think there is at least a moderate need for an MBA type of education in agribusiness. Moreover, 35.9% of them think the need is considerable or high.

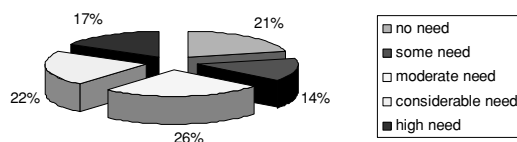


Figure 13: Opinion on need for MBA education N=404

Table 8: Possibility of scholarship for the MBA education

Description	Frequency	Percent
No possibility	92	22.3
Some possibility	61	14.8
Moderate possibility	41	10.0
Considerable possibility	41	10.0
High possibility	15	3.6
Do not know	162	39.3
Total	412	100.0

In the case of a possibility for financing of education by their employers, „Do not know“ answers have the highest share: 37.3%. Then follows 21% of respondents that thinks there is no possibility to get scholarship paid by employers. However, there is still significant share of those who thinks the possibility is moderate (9.4%) or even considerable to high (12.9% together).

When asked about number of potential students from their firm, many respondents did not answer. Of those who answered, one half thinks that one student can be expected per year. 36.62% of respondents think that 2–5 students are

Table 9: Possible number of students from the firm

Number of MBA students per year	Frequency	Percent
One only	73	51.41
2-3	44	30.99
4-5	8	5.63
More than 5	17	11.97
Total	142	100.00

expectable, and 11.97% thinks more than 5 students could come from their firm.

The results are evidence for need for MBA education in Croatian agribusiness. This also proves that the AHEAD project activities and expected outcomes were planed in accordance with present situation in the sector.

Conclusion and recommendations

Since the beginning of the Nineties, the Croatian system of higher education experienced comprehensive changes to adjust to the economy in transition. Market orientation and the emerging private business sector, together with the new system of public administration; have imposed new demands on universities, polytechnics and other higher education institutions.

In the agribusiness sector, demand for a new kind and number of experts is rising, while higher education institutions are losing students. With the intention to confront the trends, in the frame of the AHEAD project, a comprehensive training needs analysis has been carried out.

Results of the field research and of the desktop research give us direction if the education system is to respond successfully to the need of agribusiness sector.

Information and proclaimed objectives found in official strategic documents of Croatian public institutions are united about idea that the education system has:

- to provide increasing number of high educated people,
- to make available efficient lifelong learning scheme,
- to provide internationality of the education,
- to reinforce business-to-education links.

Regarding to quantification of need for educated persons of different professions, information are not quite available. However, this field research can be regarded as the first one attempting to do such quantification. Furthermore, it includes inquiry of specific skills and knowledge needed by present-day professionals in agribusiness and related public administration system.

The results of the survey carried out among 434 agribusiness professionals can be summarised as follows:

Most of the professionals are employed in private firms and then public institutions. Mainly, they work as managers or consultants and their background is agriculture or economics in most of the cases.

Asked what knowledge or skill a professional has to have, the most usually they mentioned organisational and management or foreign language and computer skill. High on the list are some other knowledge as well: legislation, communication, marketing, human resource management and production technology.

When they have had to rank possible study programs in field of economics and agribusiness, the most popular ones were titled „Agri-food Technology“, „Trade and Marketing“, „Management“, „Environmental and Natural Resource Management“, „Food Quality and Safety“ etc.

Based on the survey, it seems that graduates of such studies would most probably find their jobs in the business service sector, finance, the agri-input industry or tourism.

Evaluation of needed graduates per year differs significantly among the study programs. It is highest for the „International Economy“ program among the economic programs, and for the „Food Quality and Safety“ program among agricultural programs. Altogether, the research shows that Croatia will need 800 to 900 graduates from all the programs annually. This is 250 more than number of graduates Croatia has in biotechnological sciences today.

In connection with final part of the research, we can conclude that the Croatian agribusiness sector is looking for highly educated professionals. Therefore, there is an opportunity for higher education to widen the market and to answer the need.

In order to utilise the opportunity the higher education for agribusiness should have in mind key recommendations, which emerged from the results:

1. high education business is a business with specific market that has to be monitored, planed and nourished if it is to be preserved
2. in addition to knowledge and skills traditionally associated to agriculture, up to date higher education for agribusiness have to pay more attention to organisational, management, foreign language and computer skills
3. collection of study programs or curricula at higher institutions has to be modern and flexible to keep the institution attractive to students
4. education institutions can not provide successful and attractive programs if they do not consult the industry
5. problems of unemployment and of unattractive study programs should be solved by introduction of new programs or adjustment of existing programs in scope and structure.