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TRENDS IN THE EUROPEAN SYSTEM OF HIGHER EDUCATION AND DEVELOPMENT OF HIGH TECHNOLOGY IN THE FIELD OF FOOD SCIENCE

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Selected points of view on European system of education in relation to Food Science and the new possibilities of knowledge and technology transfer are presented in the article. The transfer of knowledge generated through research to the system of education and its use in innovation processes is described. The authors present the multidisciplinarity and specificity of food industry and the problems in the transfer of knowledge from universities to the developing industry. Moreover, the Bologna process, perspectives of internationalisation in education and the possibilities of the development of innovation processes and competitiveness are discussed. Excellence centres and technology parks are presented as important elements in the development of innovation and transfer of knowledge from higher education institutions to industry. The academic community of Wroclaw is presented as an example of a new model of multidisciplinary cooperation.

BOLOGNA DECLARATION AND INTERNATIONALISATION OF THE EDUCATION SYSTEM

The knowledge on economy and society stems from a combination of four interdependent elements: the production of knowledge, mainly through scientific research; its transmission through education and training; its dissemination through information and communication technologies; and its use in technological innovation. At the same time, new configurations of production, transmission and application of knowledge are emerging, and their aim is to involve a greater number of players, typically in an increasingly internationalised network-driven context [Anonym, 2003].

In the year 1999, 29 European Ministers of Education (including the Polish Minister) signed the Bologna Declaration on the European Space for Higher Education. This was the beginning of the so-called "Bologna Process", the aim of which is to create European Higher Education Area (EHEA) by the year 2010. This political decision was initiated by the European Commission with support of the academic communities.

The next 16 countries have declared their willingness to participate in the Bologna Process, *i.e.* by now 45 countries are the signatories of the Bologna Declaration. The idea that emerged in the meantime was to make Europe an open and attractive area also for students form other countries and continents such as South America, Asia and Africa [Jamiołkowski, 2006].

The main purpose of the Bologna Process is to enhance the employability and mobility of European citizens and, secondly, to increase the international competitiveness of European Higher Education. Apart from that, the attractiveness and position of the European system of higher education should be improved adequately to its input into the development of our civilization.

The most important element of the Process is harmonisation of the system of higher education with respect to the autonomy of countries and universities.

EHEA has the following key objectives: (a) Adoption of a system of two main cycles of undergraduate and graduate degrees. After the Berlin Conference, the third (doctoral degree) was included; (b) Establishment of a system of credits (ECTS) as means of promoting student mobility; (c) Adoption of a system of easily readable and comparable degrees and the implementation of the Diploma Supplement in order to promote EU citizen employability and the international competitiveness of European higher education; (d) Promotion of European co-operation in quality assurance; (e) Acknowledgement of Life Long Learning; (f) Promotion of interdisciplinary education; (g) Changes of legislation to promote mechanism stimulating academic activity; and (h) Promotion of the necessary European dimensions, particularly for curricular development and inter-institutional co-operation [Kraśniewski, 2004].

The Bologna process is about creating an open and transparent European Higher Education Area, and represents the greatest change in (and challenge to) continental European universities since generations, if not centuries.

The use of the European Credit Transfer and Accumulation system, based as it is on student workload, is one symbol of the paradigm change which universities are asked to make, away from "input" orientation to "output". We are talking of skills and competences, of learning outcomes and lifelong learning.

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But again Bologna is forcing us to change; the freedom of research and teaching is not threatened, but we have to introduce quality mechanisms such as evaluation and accreditation (many sides of the same coin, that of quality assurance) [Mitchell, 2006].

European universities have for long modelled themselves along the lines of some major models, particularly the ideal model of university envisaged nearly two centuries ago by Wilhelm von Humboldt in his reform of the Germany university, which sets research at the heart of university activity and indeed makes it the basis of teaching. Today the trend is away from these models, and towards greater differentiation. This results in the emergence of more specialized institutions, concentration on a core of specific competences when it comes to research and teaching and/or on certain dimensions of their activities, *e.g.* their integration within a strategy of regional development through adult education/training [Anonym, 2003].

A very interesting view point has been demonstrated by Prof. Scharff [2006] at the conference "Consecrated educational system in Europe", held at the Nicolaus Copernicus University in Toruń, Poland. He confirmed that, since centuries, universities have been known as institutions freely performing high level research and education. Original research is a precondition for high level education, the fact known as "Humboldt's ideal". Therefore, the discrimination of two types of universities, namely "research universities" and "educational universities" does not meet the requirements of quality in future research. Furthermore, the traditional university stands for the unity of learners and teachers, a principle which in many aspects goes far beyond the definition of students as "clients" of the universities, especially because a student, as a "member" and in consequence a "part" of university, contributes to its further development, whereas a client will simply take advantage form the universities' educational system.

There has been a variety of proposals, for example "professionalisation of head of university", "introduction of management structures into university", "creation of an efficiency principle in the university" or "enterprise university".

All these proposals contain chances as well as dangers. A closer contact between universities and enterprises can improve the financial situation of the universities and also contribute to an improved and practically-oriented education of students. On the other hand, there is a certain danger that the universities might lose their independence in research and education. Therefore, it seems to be very necessary to adopt the inner structures of universities to the new development in order to preserve the university as an institution sticking to the original principles. Furthermore, it must be stated that universities have an important role in the development of society, as they are the "creative nuclei", which are pushing forward not only the technical but also social development, and which can function as protected rooms for academic discussions of all relevant problems [Scharff, 2006].

The highly competitive system of university education must be harmonised with the most advanced research and technology and also highly developed scientific levels and expertise value. Food Science covers a vast area of knowledge, incorporating such spheres as mathematics, chemistry, physics, biology with microbiology, law, economics *etc*. Thus, the ideas and philosophy are perfect examples of a multidisciplinary area of knowledge [Trziszka, 2006].

In Europe, graduate studies in Food Science have various characteristics: specific focus or a multidisciplinary program including science, engineering and management; training period (internship) in industry; and exposure to different languages. European Credit Transfer and Accumulation System (ECTS) is used to facilitate exchange of students. The European Union finances the exchange of students and teachers through networks of universities and schools in Europe and with institutions around the world where exchange of teaching methods and scientific information occurs. Distance education, continuing education and opportunities where the student alternates between course work and working in the industry are other modes of education. The organization of Ph.D. programmes varies depending on the country. Other initiatives for collaboration with other parts of the world include international Masters' programs and courses which prepare students for teaching (for example, courses in curriculum development and pedagogy) [Dumoulin, 2004; Trziszka, 2006].

Internationalization of education is clearly an attractive area for development in today's global view. High student mobility combined with a sense that universities need to be globally connected to maintain or improve their international profile has brought this into focus more than ever before. Traditionally, international networking for undergraduates has been by student exchange programs, and also by courses at one institution being open to students from other countries [Purslow, 2004].

However, the recent trend is towards collaboration between institutions to provide joint courses, such as the European Masters in Food Studies. It was discussed by Elizabeth Dumoulin in her presentation at the Round Table session at the Congress of Food Science and Technology in Chicago, 2003 [http://www.eurmscfood.nl/]. There are several perceived areas of benefit from such joint ventures. In our current climate there is a universal requirement to look for improved efficiency in the provision of education, while maintaining or, if possible, improving the standard of the content and delivery. This applies all across the spectrum for the teaching of very large classes to the problem of small (nonviable) classes. There is also a move towards courses that have added-value by virtue of combining the resources of several high-quality centres of expertise. In addition to the distance education program at the Michigan State University [http://www.msu.edu/course/fsc/490/], the MSU Studies Abroad Program is another example of added-value. The program is a study tour on international food law of Asia or Europe in alternative years, involving a Canadian as well as US tutors to give added perspectives on the practices and regulations in the countries visited. Alternatively, the added-value can result from courses seeking to combine the very best elements in the area of education from the global pool of expertise, the "best-of-the-best" approach. The University of Kopenhagen (former KVL) has instituted international (English language) offerings of many of its in-house undergraduate and Master's courses, and also offers "Semester Packs", groupings of related courses, to provide a complete semester of English language-based instruction for foreign students visiting the KVL. The KVL has also proposed a complete Master of Food Quality program in English [Purslow, 2004].

As a final note, it may be observed that these Scandinavian models have a structure similar to the more substantial EU-sponsored programs such as the Socrates-Erasmus program supporting mobility of students (and, to a limited extent, instructors), where the emphasis is on providing funds to transport either students or instructors to facilitate international education in a face-to-face environment. By contrast, it seems that the North American model has a stronger thrust in the area of electronic or distance education [Purslow, 2004].

PROGRESS OF EDUCATION IN FOOD SCIENCE AND INDUSTRY

Food science is multidisciplinary and the food industry of today very frequently uses high technology. That means that this sector becomes more difficult to reach without a good scientific education and technical knowledge. Changes in education lie mainly in learning/teaching methods. Thus, teachers must always ask the questions, what to teach and how to teach [Mitchell, 2006].

The European food industry comprises both small and large enterprises, with more and more international dimensions. Food production requires taking into account very different habits and means. Quality and security in production, environment, and management of water, wastes, and energy are the keywords in the task of satisfying the changing needs and life-style of consumers [Dumoulin, 2004].

The main objective of food studies after high school is to prepare professionals for the food industry, but also future researchers and teachers. Preparing students for their professional life means imparting scientific knowledge, but also training them to use it well, to think and to assume responsibilities in the world of food.

The curricula depend on the objectives of the degree which can be oriented towards food science, food engineering, or food management. In some cases, the content is made up of roughly equal parts of all 3 domains. Food engineering generally includes food technology. In some countries food engineering is a part of chemical engineering.

Generally, basic sciences are complemented with more practical sciences, covering all the stages of food life, from raw materials to consumers, including processing equipment, energy, and waste treatment. In this context the traceability of food products becomes very important, particularly in the aspect of European food quality and safety system [Van der Spiegel *et al*., 2004]. Safety of environment has to be taken into consideration as well.

Foreign language teaching is very often a part of the curriculum, with appropriate credits given. Teaching/learning methods are changing considerably. Of course, conventional lectures with exercises (calculations) always exist, using computers more and more. Practical work in the laboratory (analysis, microbiology and so on) and in pilot plants (unit operations in food engineering) is usually required and demanded by the food industry to improve practical knowledge of the graduates. However, this kind of practical teaching is costly (products, equipment, utilities) and there is some tendency to replace it by demonstrations, detailed field visits, and computer simulation [Dumoulin, 2004].

After their food studies, about 50% of the graduates are professionally active in the food sector and the other half in pharmaceutical, cosmetics, and related industries. Activities are shared between production, R&D, technical sales, quality management and others. More than 50% of students are women (in Poland more than 70%). A small percentage of students prepare for a Ph.D. leading to careers in academic institutions and/or research.

In the future, universities will more and more depend on a strong relationship with their alumni. This is necessary not only because of desired donations – which already now play an important role in the traditional universities, especially in Britain and the United States – but also because of the chance to learn from former students, now being involved in the production process, in administration, in service enterprises *etc*., how can the university education be improved to enable our next generation to be most successful in their career. Furthermore, the alumni are welcome to return to their alma mater from time to time in order to refresh their knowledge and to be introduced into new scientific fields, a requirement which is often addressed as “lifelong learning” [Scharff, 2006].

Most teachers keep contacts with former students, either personally or through professional associations. These contacts seem to be useful not only to help organize training periods as explained above but also for getting feedback on the effectiveness of the studies and the needs as perceived by the graduates. Life-long continuing education is provided either by universities or by special enterprises [Damoulin, 2004; Trziszka, 2006].

More and more contacts are being developed between students/university and young children, scholars, and the public at large. The university should play a role in promotion of new ideas in food production and consumption and also trying to explain what “food science, food technology, and healthy food” mean. It should be a good idea to recruit future students.

Purslow [2004] made a very interesting observation associated with education by international networking after round tables discussion at the Congress of Food Science and Technology in Chicago in 2003. He expressed in his presentation that provision of highly specialized and detailed courses, essential for high-calibre graduate student education, often poses a problem of small, but essential classes. There are many pitfalls, costs, and successes associated with this problem. For example, meat science, is a relatively strong area of research and graduate education in the Nordic countries. Good-quality Master’s level education exists in all countries. Two solutions were considered with the Nordic Forestry, Veterinary and Agriculture University. (NOVA), a virtual organization, and the Nordic Network for Meat Science (NNMS). Several major barriers to implement a concerted Master’s degree under NOVA related to the realities of resource management and costs. The resource implications effectively meant that the proposed sharing of courses within an existing subject area proved nonviable, although it was recognized that new Master’s courses could be constructed on this model. A successful resolution to the problem focused specifically on teaching doctoral level courses. NNMS provides an electronic communication forum, training courses, and an annual workshop for approximately 60 workers in the field with an emphasis on graduate students. The annual workshops allow a relaxed forum where PhD students discuss their work with

leaders in their area. NNMS conducts doctoral courses with a very high standard, utilizing both local research expertise of international standing and bringing in well-known figures from the USA and Australia as guest teachers. Further funding has been successfully obtained against the promise of incorporating the Baltic States (Lithuania, Latvia, and Estonia) into the network [Purslow, 2004].

Padilla-Zakour [2004] has presented an interesting example for the university-based food venture centres. She explains that food entrepreneurship is a vital part of the food industry that focuses on creating specialty foods from agricultural products. Many entrepreneurial businesses are farm-based to complement the fresh market with longer shelf-life value--added processed foods that utilize products not suited for the fresh market, and excess production that commonly ends up as farm waste/losses. In some cases, the agricultural production is solely dedicated to fulfill the specialty niche market targeted by the small processor. Food entrepreneurs need comprehensive assistance to become successful processors and marketers. As start-up ventures, their knowledge and economic resources are limited. Support from university-based food venture centres must include training, counseling, technical services, regulatory compliance assistance, technology transfer, and specialized referrals.

The Northeast Centre for Food Entrepreneurship, a joint effort of the Cornell University and the University of Vermont, is a successful model that benefits from key partnerships to promote food ventures in rural and urban communities. For the last years the centre has provided assistance and training to more than 3500 individuals interested in food entrepreneurship, and assisted the development and marketing of over 1000 specialty products [Padilla-Zakour, 2004].

NEW CHALLENGES FOR THE EDUCATION SYSTEM

The European university landscape is primarily organized at national and regional levels and is characterised by a high degree of heterogeneity which is reflected in organization, governance and operating conditions, including the status and conditions of employment and recruitment of teaching staff and researchers. This heterogeneity can be seen between countries, because of cultural and legislative differences, but also within each country, as not all universities have the same vocation and do not react in the same way and at the same pace to the changes which affect them. The structural reforms inspired by the Bologna process constitute an effort to organize that diversity within a more coherent and compatible European framework, which is a condition for the readability, and hence the competitiveness, of European universities both within Europe itself and in the whole world [Anonym, 2003].

Searching for new formulae of knowledge development and their transfer to education system and also implementation to the industry is a very great challenge for all of universities which educate experts in food technology.

To improve the quality of education for all of our students, faculty members need to consider how student learning is assessed. In classes, lectures followed by standard exams work well for certain types of learning (recognition patterns), but that traditional approach does not foster deep learning [Halpern & Hakel, 2003].

Recognition tests are not a particularly good index of learning, specially for log-term retention. The ability to do well on an exam in food chemistry as junior in college does not necessarily translate into the ability to use that information when faced with a critical decision in a subsequent job. In fact, it often seems that the student has already forgotten the information by the time it is needed in the next class. Perhaps the main problem is that the traditional approach does not teach how to relate the principles to new applications. The students can relate the facts, at least over a short term, but have not really understood the material because they have not been required to use that information in different ways under different circumstances [Halpern & Hakel, 2000, 2003; Hartel, 2004].

Another very interesting proposition for the education system seems to be that of Hartel's [2004] connected with the assessment of learning outcomes. He suggests that learning outcomes must be written for each individual course as well as for the curriculum as a whole and assessment within each course and across the curriculum is recommended. This approach is significantly different from the traditional education approach used most commonly and requires a change in perspective on the meaning of teaching without sacrificing the good things that come out of our current education system. For most programs, the first step in developing an assessment program is to identify a set of learning outcomes in the broadest sense. Assistance of an education expert to help write true learning outcomes should be solicited; as well, input from the industrial sector should be invited. Once learning outcomes have been developed for the curriculum as a whole, individual courses can be prepared to bring the most logical learning sequence together. Individual courses may follow traditional lines or courses may be reorganized in some other way to promote student learning within the resources of the program. As the curriculum is designed, thought should be given to how student learning develops across the curriculum. For example, developing team work skills my be coordinated at several points in the curriculum. In this way, students are exposed to the concepts, allowed to practice their skills, and then evaluated on their competence in a manner consistent with what they will be required to do upon graduation. Using the approach suggested here, a curriculum with coordinated instruction to promote and to assess student learning can be developed. The outcome of such an approach to instruction will be enhanced student learning and competency upon graduation.

Although the assessment of learning outcomes is recognized as an educationally sound approach to instruction, to convert from a traditional curriculum to one based on the assessment of learning outcomes requires some significant changes in faculty outlook. The curriculum must be made more student-oriented and less instructor-oriented. Faculty must change from being lecturers to being coaches whose job is to assist student learning in well-designed and meaningful activities. For many faculty members, these changes are not easily made.

There are numerous reasons for faculty resistance to change this magnitude. Very few of us are trained as teachers so we gravitate towards the teaching approach that we learned from the traditional model. The time and energy required to re-evaluate the curriculum and change instruc-

tional approaches may seem overwhelming, and since most instructors are already overtaxed with other responsibilities, there is no time and energy to spend on such changes [Hartel, 2004].

CHANGES OF THE TRADITIONAL VIEW POINT ON THE UNIVERSITIES

Very high competition on the world market of the education and knowledge transfer have to accelerate changes in the European high education system.

The European Union needs powerful and flourishing universities. We have to built excellence in its universities, to optimise the processes which underpin the knowledge society and meet the target, set out by the European Council in Lisbon, of becoming the most competitive and dynamic knowledge based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion.

All over the world, but particularly in Europe, universities face an imperative need to adapt and adjust to a whole series of profound changes. These changes fall into six major categories.

(1) *Increased demand for higher education*. This will continue in the years ahead, spurred on simultaneously by the objective of certain countries of increasing the number of students in higher education and by new needs stemming from lifelong learning. Apart from that, high education significantly decreases the problem of the unemployment.

(2) *The internationalization of education and research.* The momentum of internationalization is considerably speeded up by new information and communication technologies. The result is increased competition. It is a very great chance for development of co-operation between universities (students and researchers) and improvement of the education system. On this basis different European programs can be realised.

(3) *Development of effective and close co-operation between universities and industry.* Co-operation between universities and industry needs to be intensified at national and regional level, as well as geared more generally to the transfer and dissemination of knowledge. The creation of knowledge transfer nets between universities and industry, collaborating with academic incubators or technological parks seems to be of great importance.

(4) *The proliferation of places where knowledge is produced.* This development and the increasing tendency of the business sector to subcontract its research activities mean that universities have to operate in an increasingly competitive environment. In new developing situation, universities ought to participate by progress of technology in industry not only by direct transfer of knowledge (high tech), but also by engagement and co-operation in the field of evaluation of product or improvement of management system.

(5) *The reorganization of knowledge.* This is to be seen in particular in two trends which pull in opposite directions. On the one hand, we have the increasing diversification and specialization of knowledge, and the emergence of research and teaching specialities which are increasingly specific and at the cutting edge. On the other hand, we see the academic world having an urgent need to adapt to the interdisciplinary character of the fields opened up by society's major problems such as sustainable development, the new medical scourges, risk management, *etc*.

(6) *The emergence of new expectations.* Alongside its fundamental mission of initial training, universities must cater for new needs in education and training stemming from the knowledge-based economy and society. These include an increasing need for scientific and technical education, horizontal, skills, and opportunities for lifelong learning, which require greater permeability between the components and the levels of the education and training system [Anonym, 2003].

Today, if they want to exist, universities should adapt to challenges of globalisation. The education system has to be associated not only with scientific ideas, or result from research, as it was in Wilhelm von Humboldt's philosophy but also, or first of all, the knowledge produced at universities has to be used for the society, for the needs of region or industry. The knowledge has a special high value and has to be "for sale". In this case the universities become very competitive and can speed their development and enhance their value.

TRANSFER OF KNOWLEDGE

The growth of knowledge society also requires universities to become more closely involved in community life. Alongside and as a natural result of the exercise of its fundamental missions to produce and transmit knowledge, the university today functions particularly as a major source of expertise in numerous areas. It can and must increasingly become a forum of reflection on knowledge, as well as of debate and dialogue between scientists and people [Anonym, 2003].

Filho [2006] confirmed that the current emphasis on innovation as a source of industrial competitiveness and hence prosperity was put in Europe in early 1990s. A series of brain-storming meetings on innovation and technology diffusion policy had been held prior to drawing up. A Maastricht Memorandum "An Integrated Approach to European Innovation and Technology Diffusion Policy" in 1993, which stated that "Innovation and technology policy has an important role to play in developing the quality of life. The latter causes an essential need to guide the technical change towards important public goals such as environmentally sustainable development" [Filho, 2006].

Yet, innovation is the key factor in industrial competitiveness for any country. In order to help research achieve concrete outcomes and economically beneficial and socially desirable results, mechanisms need to be set up to promote innovation, exploit the results of scientific work, and stimulate the creation of innovative companies.

There is no other way to new technologies than through education that is both permanent and suited to the new technological requirements, and innovation. The secret is in knowing how to convert scientific progress into industrial and commercial successes and traditional institutions as universities also have to retrain themselves. There is nothing in common with the craze for innovation, since the cardinal function of new technologies is not to recreate a paradise on earth but rather to mitigate, often at a huge cost, the towering difficulties of future survival.

The role of universities and research organizations is very

important as it creates new technological ideas and innovation, which ought to be implemented by industry. From this state of affairs, some future trends can be identified. These are as follows: (a) the promotion of clustering and co-operation for innovation; (b) the promotion of regional cooperation; (c) the need to strengthen institutions; and (d) the need to provide long-term funding.

Finally, there is one final matter countries should be mindful of. This is the need to avoid the "good old" linear model of innovation, indicating the strength – as well as the way of thinking – of the "science" lobby. The systemic, complex nature of innovation and new technologies, even the basic concept of demand for innovation, should be kept in mind at all times. Research, development and innovation should always go hand in hand and should be seen as such in national development strategies [Filho, 2006].

The globalisation involves new challenges for the development of knowledge in food science and competitiveness in the food industry. The most important is harmonisation between research and implementation and their transfer to the education system.

Graduates and results of research (patents, licenses, publications, papers, conferences *etc*.) are the final product of universities and other institutions of higher educations. The graduates must be able to face the harsh economic and technological reality making the most of their theoretical knowledge and often too little experience from various professional placements they had during their period of study. The results of research, often long-term research, presented in the form of publications or patents, are kept in libraries or files of their authors and seldom reach their addresses. Often, very valuable results of arduous research remain unknown for a long time or are never used in practice because of inadequate promotion or a lack of financial support for their practical implementation. This problem does not necessarily result from the fault of the scientists or their lack of expansiveness. This is a frequent situation occurring in all universities based on the traditional system in which the final product of research is the publication, not the implementation of results. The procedure is very expensive and it is virtually impossible for higher education institutions to practically use all their products. Thus, in the modern system of transfer of knowledge from the university to industrial practice in the form of "high tech", intermediary links are indispensable. Technological parks are the most original and suitable as it is where the knowledge and academic results presented as patents and publications may be transformed into new market products of high technological value. For example, the professors' firms of the "spin off" type are the best for transferring knowledge and its evaluation. Such transfer is positive for science polarisation and the acceleration of high technology development, and also improvement of economical value of the regions. The transfer of knowledge is a very important value for the present strength and development of EU Member States [Trziszka, 2006].

A very good example of the integration of research, development and implementation seems to be the developed phenomenon of the academic environment of Wrocław. In 1998, three universities (Wrocław University, Technological University and Agricultural University) established the Technological Park of Wrocław. Now it is a very strong institution of high technology. Here, scientific ideas and knowledge will be developed, which will be transformed to a high value product of market. The Technology Park is a very great chance for progress of economy, technology and regional development.

Independent scientists and Ph.D. students of the leading universities of Wrocław collaborate in a few areas, like high-technology, nano-technology, bio-technology, bio-medical, agro food, *etc.* Other very important institution for knowledge transfer is the Centre of Excellence – Wrocław Center of Technology Transfer established at the Wrocław University of Technology.

All these actions gave rise to the development of new inter-university scientific centres. They were soon joined by such major companies from the Lower Silesia as KGHM or Kogeneracja and, in the year 2003, the Lower-Silesia Centre for Advanced Technologies [Pol. Dolnośląskie Centrum Zaawansowanych Technologii (DCZT)] was created with the support of the Marshall's Office (Regional Government).

The aim of the Centre (DCZT) is to financially support advanced research serving the needs of the region and its industry. The results will be practically used by highly specialised academic technological firms operating in the Park. One of the recent ideas is to create an academic incubator and professors' firms of the "spin-off" type, where students and scientists may broaden their knowledge and introduce it to the market of high technology.

This new model enterprise combining the knowledge, research results, technical development and the system of education in an academic-industrial environment is very innovative, highly competitive and may also play an important role in the development of our civilization.

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TRENDY W EUROPEJSKIM SZKOLNICTWIE WYŻSZYM ORAZ ROZWÓJ WYSOKICH TECHNOLOGII W OBSZARZE NAUK O ŻYWNOŚCI

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W artykule przedstawiono niektóre poglądy na europejski system edukacyjny w odniesieniu do nauk o żywności, uwzględniając nowe możliwości transferu wiedzy i technologii. Podjęto próbę opisania transmisji wiedzy od strony badań naukowych do systemu edukacyjnego i dalej jej wykorzystanie w procesach innowacyjnych. Wskazano na wielobranżowość i specyfikę przemysłu żywnościowego oraz istniejące problemy w przekazywaniu wiedzy z uniwersytetów do rozwijającej się gospodarki. Zwrócono uwagę na proces Boloński oraz perspektywy internacjonalizacji w edukacji i dalej możliwości rozwoju innowacyjności i konkurencyjności. Jako jeden z ważniejszych elementów rozwoju innowacyjności i transmisji wiedzy ze szkół wyższych do gospodarki mogą być centra doskonałości i parki technologiczne. Pewien przykład zarysu nowej perspektywy wielopłaszczyznowej współpracy można wskazać w akademickim środowisku Wrocławia. Wydaje się, że jest to rozwijająca się tendencja w szerszym aspekcie.