

Editorial



In the European Union the most important social and economic programme, pointing out the development directions in the fields significant on the global market of goods and ideas is the Lisbon strategy, which the main aim is the creation of the most competitive and dynamic economy in the World till 2010. The realisation of aims of the Lisbon Strategy requires sufficient participation of the sphere of researches and development and concentrates on taking activities in four key fields such as: knowledge-based economy, liberalisations of markets (telecommunications, energy, transport and financial ones), imitiveness and the social unity. On the background of the general tendencies it is worth asking about priority directions of researches in the own country which as a member of the European Union realises the assumptions of the Lisbon Strategy.

It is not awkward that I will concentrate on the Polish matters in my considerations. The condition of the achievement of fast and broad development by Poland as in many other countries, especially of the European Union is knowledge-based economy in which real richness including economical effectiveness, economy competitiveness and new workplaces is connected not only with the production of material goods and also with manufacturing, transfer and use of knowledge. Knowledge-based economy is able to sustainable development, the creation of a greater number of permanent and innovative workplaces and characterised by greater social unity, featured with the fast development of those branches of economy which are connected with information transformation and the development of science, branches of industry numbered among high technology and also technology and services of the information society. In economy such a source of competitive dominance of the most of companies, including those small and medium ones are knowledge consuming undertakings. The essential condition of the transformation to knowledge-based economy is then a promotion of fields being a main means belonging to five main fields, that is to education, science and research and developmental activities, high-tech industrial branches, business services connected with knowledge-based economy and service sector of the information society in order to achieve 15% as a minimal coefficient of the level of development of those fields measured by the participation of the employment in given fields (in Poland that coefficient equals ca.10% at present). At the same time the promotion and the modernisation of fields being main means of knowledge-based economy in order to use better the existing country economic potential among others: job, knowledge and capital and also the outworking of new forms of competitive dominance by the growth input on pro-developmental activities and methods of their effective use for economic aims.

In those activities engineering and technical and scientific activities play an important role what does not correspond with the present system of education in Poland. At universities where as many as ca. 33% graduates graduate from studies in the field of business and administration, ca. 14% in the field of pedagogy and ca. 14% in the field of social science at the observed decreasing tendency in the field of engineering and technical studies (only ca. 6%). It leads to serious lacks of specialised young research staff able to create technological innovations and causes the decrease of effectiveness of activities in the field of technique and technology. For example in the European Union, so in Poland, there are serious lacks of specialists in the field of computer programming, estimated in the scale of the European Union for the nearest years for ca. 250 thousands of specialists per year. It is obvious that then the structure of education directions and the change of a didactic offer of higher education and also inevitable change of professional orientation of youth are required, if any reasonable relations between chances of graduates connected with studies taken in a chosen direction and the possibility of being employed after their graduation in a trained profession resulting from the situation and expectations on the job market are to be kept.

It is necessary to pay attention to the fact that the measure of the degree of modernity and originality of technological outworking are mainly patents and sold licences and not as it is often thought in Poland a coefficient of the number of scientific publications in the relation to 1 mln of inhabitants registered by Thomson Science in Philadelphie in the USA, which in Poland in 2002 equalled ca. 270 in comparison to a significantly lower one in 15 countries, creating previously the European Union, equalled then only ca. 80. The greatest number of Polish publications deals with astrophysics, mathematics, physics, psychology, psychiatry, economics and business that is why there is a deficit in most fields being a main means of knowledge-based economy. Among others it proves malfunctions in research and developmental activities in Poland and also deals with materials and manufacturing engineering. In a sense the mission of our Journal of Achievements in Materials and Manufacturing Engineering can present it creating increased chances for the publication of their own scientific output aiming to support the promotion of those innovative fields of researches and developmental works to the representatives of those disciplines of technical sciences.

The relatively high level of budget financing of research and developmental activity in leading countries in knowledge-based economy, including the USA, Japan, France and Germany increases synergically the level of financing research and developmental activities from non-governmental resources. According to the data concerning various countries a minimal threshold of budget financing of that activity is equal 0.4-0.6% of national gross product and its exceeding causes at average 3-4 times bigger increase of non-budget financing, and at the same time suitable increase of the range of the implementation of research results causing notable economic effects. Budget expenditure put on researches and development are in fact the investment which aim is the improvement of economy competitiveness and irregular economic growth. If a level of expenditures on researches and development is situated below a mentioned threshold what takes place unfortunately for many years in Poland, granted financial resource are donated, first of all, for own needs of the scientific society ensuring its survival without paying a suitable attention to the meaning of application effects for researches and economic advantages connected with it. In the USA and Japan, Korea and Singapore there is a domination of expenditures on applied researches and developmental works over the ones on fundamental researches, however in the countries of central and eastern Europe there is a clear underinvestment of those researches. Out of those three groups of those researches, such as life science (including biology and biochemistry, ecology, agricultural science and clinical medicine), science and engineering science (including physics, chemistry, mathematics, astrophysics, geology, computer science, materials science and engineering science) and social science (including sociology, history, economy and management, pedagogical sciences, psychology, psychiatry and law), in the richest countries such as the USA, Switzerland and Norway and the poorest as Nicaragua, Cuba, Bangladesh, Burundi life science dominates. However, science and engineering science dominate in countries of system transformation of economic growth of South-East Asia and some other counties such as Portugal, Brazil, Tunisia and Egypt. In the rest of the countries there are various models of research profiles.

In Poland the dominance of science and engineering science is significant, although smaller than in other countries transforming their economy. That is why effective application of budget resources on researches and development requires to define priority a direction of researches which in the bigger extent can boost the

development of economy.

Scientific priorities should fulfil social and economic needs, and also take into consideration chances for science itself. Strategic scientific and technological priorities in Poland have been divided into 4 thematic fields such as: Info (software engineering, knowledge and decision support, intelligent, telecommunication and tele-information of a new generation, optoelectronics), Techno (new materials and technologies, nanotechnologies, specialised system design, mechatronics), Bio (biotechnology and bioengineering, biological progress in agriculture and environmental protection, new goods and medical technologies) and Basics (computational sciences and the creation of new information resources, solid-state physics, chemistry, technology and chemical engineering). The choice of priority directions of the development of science and technology with the big participation of scientists, businessmen, representatives of public administration, non-governmental and social organisations and politicians taking into consideration the possibility of the development of knowledge-based economy requires the constant verification of the foresight method being a systematical and future reaching information and enabling formulating directions and priorities of medium- and long-period developmental visions connected with current decisions and activities.

Because of my own scientific interests I would like to pay the special attention to new materials and materials processing technologies. Increasing requirements which are demanded to

modern mechanical, thermal, optoelectronic systems and also microsystems, and also the development of modern information technologies force to application of new materials which must be at the same time environmentally-friendly ones. The

starting point for new materials design is the development of the theory of correlated systems as a domain of solid-state physics, most often called condensed phase physics or complex systems one which combines the familiarisation with the properties of quantum and classic systems of numerous bodies, creating the fundamentals of the development of contemporary technology, including microelectronics, photonics, sensor technology, unconventional methods of energy generation and storage and is closely connected with the development of optoelectronics, materials engineering and nanotechnology and spin electronics and chosen ranges of computational sciences, chemistry and biology. It is accompanied with a very dynamic development of materials processing technology, including also nanotechnology.

Having at a disposal modern materials and materials processing technologies thus condition the development of companies offering competitive products on home and foreign markets causing in that way the creation of numerous workplaces and further economic development. In Poland to the most developmental direction of researches in the field of new materials processing technology belong electronics and optoelectronics,

ballistic ceramics and the one for the application in high temperature, biomaterials and organic materials, and technologies of the achievement of semiconductor and oxide monocrystals for the application in opto- and piezoelectronics and modern technology of MBE and MOCVD epitaxy.

The application of nanotechnology also conditions the development of many fields, including among others: health protection, chemistry, power engineering, optics and protection of natural environment. It is foreseen that till 2013 the mastering of technology in a nanometrical scale can concern a huge group of products conditioning their market success. The development of nanotechnology can be used in the nearest future for manufacturing chemical catalysts, new kinds of medicines dosed in a way not applied so far, to miniature constructions of electronic, mechanical and electromechanical devices, and also in surface engineering, ceramics and polymer technology. That is why nanotechnology has already achieved the status of a national research programme in many developed and developing countries, including among others: the USA, Japan, Canada and China, and also Bulgaria and Romania and as a result of that it is also counted as scientific and research priorities in Poland. The basis of the creation of research programmes in that field is the development of researches of nanomaterials which deal mainly with nanometals achieved as a result of the application of huge plastic deformation, of the production of solid materials through consolidation of nanopowders and metal-matrix nanocomposites with the share of ceramic powders.

I am convinced that the Journal of Achievements in Materials and Manufacturing Engineering is at disposal of P.T. Authors in order to publish achieved results of researches because of that. I have pleasure to thank P.T. Authors for the efforts put in the preparation of numerous papers published in the given Issue, reviewers and editors for the efforts in the preparation of the papers for print, the editorial group for all the activities connected with the preparation of that and other issues of the Journal of Achievements in Materials and Manufacturing Engineering for print.

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Gliwice, in 2007