Journal scientific and applied research, vol. 2, 2012
Association Scientific and Applied Research
International Journal

ISSN 1314-6289

Original Contribution

TIMELINESS OF THE SCIENTIFIC AND APPLIED RESEARCH

Zhivko S. Zhekov

SHUMEN UNIVERSITY "EPISKOP K. PRESLAVSKI",
E-MAIL: ZHEKOVZ@MAIL.YAHOO.COM

Abstract: The contemporary science is developing with extremely fast pace. The current material emphasizes on the timeliness of the scientific job and the scientific and applied research. Special attention is being paid of the "inner" and "outer" motivation of the scientists when choosing the problems and the approach of the methodology in the scientific research. The role of the scientific leader has been defined as a highly knowledgeable person who knows the trends in the scientific development, the market needs and who is very well prepared to look in advance into current problems and niche markets.

Key words: scientific and applied research

The scientists are the most important and identifying factor for the development of science. Scientists have always played a crucial role in the scientific development and scientific and technological progress but in the current stage their role and responsibility seem to increase as to the humanity and earth survival. It s enough to mention nuclear energy production and the probability of a nuclear war, laser technology and the threat of "star wars", genetic engineering and the threat of creating new bacteriological weapon, the mass industrialization and the threat of ecological catastrophe.

The paper gives a professional characteristic of the scientist. However, this is a very difficult task because of the complexity and diversity of the scientific research which are defined by the differences in the scientific research in the different branches of science, by the different character of the job in the consequent stages of the cycle "research – application" (fundamental research, applied development, designer-constructor and technological activity), by the different position which the scientist occupies in the hierarchy of the organization (scientific leader, scientific organizer, scientific researcher, etc.) The personal qualities of the scientist, their talent and qualification , their way of thinking, inner and outer motivation for scientific creativity have a great influence on the success of the scientific process.

The contemporary science is characterized by a more profound differentiation [2]. It's difficult to enumerate the subjects and the

specialties in the different sciences because they are constantly increasing. Differentiation ensures going deeper when researching the facts and laws in the certain processes and phenomena and is a reason for the great progress in the scientific knowledge. It requires the contemporary scientist to be a good narrow specialist. The era of the universal scientists, of the Aristotles in the science, has gone away a long time ago. At the same time, there is a controversy between the integrity and complexity of the processes and phenomena. It is necessary to strengthen the integration links between the different sciences, subjects and specialties when researching complex processes and phenomena. It is not a coincidence that the new important discoveries are made in the cross sciences like physical chemistry, biochemistry, biophysics, molecular genetics, etc. To understand the complexity of the phenomena, to effectively take part in the integration relationships, the scientists must have brad fundamental knowledge as well. Consequently, the contemporary scientists should incorporate the good narrow specialization with broad fundamental base. At the same time, the narrow specialists cannot be universal specialists, regardless of their broad fundamental knowledge. The function of the universal specialist is taken successfully by the scientific team which integrates different narrow specialists.

The contemporary science is characterized by the changes and complications of the methodology of the scientific knowledge. The scientific researchers have to be able to use complex technology and appliances which are getting more and more broadly used in the research activities. The mathematization and cybernation of all sciences, the use of computers in the experiments and the processing of the results, the mathematical modeling of the natural and social processes make it necessary to know the basics of all these methods by every contemporary scientist.

Science as a social system is developed by its own internal laws. They define the “inner motivation” of the scientists when choosing the problems and the methodological approach in the scientific research. All these internal laws should not be overlooked. Their significance can be an obstacle for the scientific progress. The contemporary science is only a part, a subsystem from a bigger system – society and its development, functions and tasks ate defined by the relationships with this greater social system.

Having in mind the necessity to develop, the society forms its social contracts with science, i.e. there is an “outer motivation” in the selection of the problems, approaches and the methodology of the scientific research.

At the moment the institutionalization of science is increasing at a great speed and rate. Science is becoming an object of social management by government and other organs. A government

policy is formed in the science, i.e. the role of "outer motivation" increases in its development. It was only in the past when university professors, together with their lecturing and teaching practice, took part in scientific research on subjects which they wanted, as we can say "to satisfy their scientific curiosity". The contemporary scientists should get used to working on the basis of preliminary prognoses, to consider the existing scientific organization, to be able to see the basic and complex problems which are extremely important for the society development, to be able to clearly identify the goals of their scientific research. They have to be ruled by the "inner", as well as by the "outer" motivation in their jobs. Neither of them should be underestimated. The correlation between them is basically defied by the character of the scientific research. This way the end of the cycle applied research – experimental – construction development – implementation" can bring the beginning of new research.

Science has turned into a direct production power and it has become a vital factor for the technical, economic and social progress. The cycle "research – applied development – implementation" is greatly shortened. The fast implementation into practice of national and foreign scientific results becomes very up-to-date and is the main goal of the currently continuing reorganization in the structuring and management of the scientific front – a new economic mechanism and programming structuring in the science, the increase of the contract financing of the scientific research, etc. this brings new elements in the professional characteristic of the contemporary scientist. Regardless of the fact that there are scientists constructors, technologists, implementers, every scientist should include the implementation method of thinking, to seek and foretell a possible implementation of the results in reality, to participate in the development and implementation, to search multiplication of the effects. It is necessary to create such psychological attitude and such way of thinking and activity. We can point out many positive examples of such changes in Bulgarian Academy of Sciences during the recent years.

A basic moment in the professional characteristic of the contemporary scientist is that he has to be able to work as part of a team. [1]. The team method of scientific research is becoming more popular because of the deepening differentiation and the necessity of effective integration links between the "narrow specialists" when getting to know the complex phenomena in nature and society. The scientific collective ensures "the broad specialist" with deep knowledge in many "narrow" scientific subjects, universal methodical and methodological preparation and better information which are necessary when scientifically solving the problem. The lonely inventors and the "Edissons" in the science are now in the past. The scientific collective is

turning into a collective subject of the scientific research and gradually takes the role of the individual subject in this respect. [5].

The work of the scientific collective brings many significant changes in the professional characteristic of the scientist researchers. Depending on their role in the research process, they can become methodologists, experimenters, theorist, etc. The scientist experimenters in the contemporary collective should maintain themselves as creative people. And this is the reason why regardless of the division of labor in the research process in the collective, they should have certain qualities and knowledge of a methodologist, experimenter, theorist, etc.

There are complex relationships and links among the three basic types of scientists who participate in the research process (scientific leader, scientific researcher and scientific organizer) as well as among the scientific researchers among themselves. One of the most discussed problems is the contradiction and the unity of the individuality and the collectiveness in the creative process of the collective. Undoubtedly, the scientists in the scientific collective should sacrifice part of its individuality, to put it under the control of the aims and goals of the collective and the division of labor in it. At the same time the collective, with its conditions of tasks, with the competency of the separate scientists and rich methodological and informational possibilities, is the place where the individual creative skills can be fully developed. What is more, the participation in collective "brain attacks", "expertise evaluations", "conferences of ideas", etc. creates a specific beneficial environment for such development. The question is for the personal estimation of the achievement of the separate scientist in the collective. Every scientist pursues demonstration, approval and social respect. This is one of the drivers in their creative activity. Some methods of estimating the activity of the scientists do not stimulate their participation in collective tasks. For example the fact is emphasized in how many scientific papers the author is the only one or the first author in the reports for habilitation.

The job of the scientific leaders of the scientific collective is very responsible. They have to be very knowledgeable, to know the trends in the scientific development, the social necessities of the scientific provision of its development, to have a broad preparation which enables him to see the "big picture" and the links among its aspects, to have analytical, synthetical and heuristic skills, to be honorable scientists, to have self-criticism towards their own work and towards the collective work which they manage, to be able to work with people and evaluate them objectively, to create prerequisites for democracy and tolerance to the different opinion which do not coincide with their own and which are highly important for the science.

With the institutionalizing of the science, the role of the scientific organizers has increased dramatically. The skills which the scientific organizers have to possess mean that they have to be selected amongst the scientists. Science is being managed, it is not administered. It is true that with program structuring of science, the manager of the scientific program and of the program collective combines the characteristics and activities of the scientific leaders and the scientific organizers. They have to be prominent scientists and at the same time very good specialists in the sphere of the scientific organization of the scientific research.

It is impossible to create science in isolation, within the borders of one country. Science is constantly internationalizing, regardless of the fact that there are big differences in the statute of the science and scientists in the different countries [4]. International scientific cooperation becomes necessary for its development. The contemporary scientists should know foreign languages in order to be able to communicate with their colleagues abroad. This requirement is specifically valid for small countries like Bulgaria. It is a fact that about 99% of the whole world scientific information is in foreign languages. On one hand, international cooperation is necessary for the scientific development and experience exchange and on the other hand – the turning of the science into a direct productive power and the shortening of the cycle "research – applied development – implementation" force the scientific organizations and their management to keep the results with greater economic value secretive so that later they can copyright them and obtain the greatest profit out of their implementation in life. International competition in the economy becomes competition in science. International cooperation should follow strictly "the rules of the game" of the international economic cooperation. Consequently, when announcing their scientific results, the scientists should take into consideration not only their wish to show their colleagues what they had achieve, to ensure priority in science but also they have to take into account their countries' interests.

The relationship between stability and mobility takes an important place in the scientists' characteristics. Mobility in science is more dynamic and stronger in comparison with the other jobs and it continues to increase significantly.

There has always been professional mobility amongst the scientists. For example Mayer graduated medicine but he discovered the law of energy conservation; Pasteur is a chemist who started with crystallography and later he created classical microbiology, immunology and sets the basics of the classical biotechnologies [3]. But professional mobility in the past was not so popular. Its increase in the contemporary situation is determined by the fast differentiation of science and by the need of the scientists to regroup in order to solve certain

problems for a short time. The differentiation of science leads to the creation of new sciences and scientific branches on the borders between two or more existing sciences (interdisciplinary sciences and subjects).

Their formation and initial development is done by scientists from existing sciences and branches owing to the professional mobility of these scientists who change their subjects or specialty. More often this so called horizontal professional mobility is done by the change of the narrow specialty (for example a physiologist with basic medicine education becomes a biochemist, pharmacologist, immunologist or internist) but also it is not rare that they change the basic specialty(for example molecular biologists become scientists with different university education: biologists, medicals, physicists, chemists).

The broadened mobility of the scientific workers is dictated by the necessity to regroup in problem or program collectives in order to solve certain problems. This mobility is often connected with change of the work place and with the formation of new organizational structures. It can affect not only the single person but also whole collectives.

The scientists' mobility can also be done in vertical direction, in change of the position which the scientist occupies in the management hierarchy of the scientific research. The scientist can become scientific leader or scientific organizer or vice versa. The professional mobility of the scientists is necessary for the contemporary science and it will go further and deeper with its future development. It creates favorable conditions for increasing the efficiency of the scientific research. But of course, not every mobility is justified and useful. One should not go into extremes and mobility should not be absolutized. Only the reasonable mobility of the scientists is beneficial and useful. The excessive and unnecessary mobility can lead to the opposite effect – decrease of efficiency of the scientific research and slowing down the scientific development.

Therefore an important moment in the scientists' characteristics is their ability and psychological attitude to professional mobility. It requires the contemporary scientists to combine their narrow preparation with general and broad fundamental knowledge. The preparation of scientists should be in compliance with the prognoses for development and differentiation of science and the advantage is being given to newly developing branches.

These are generally the characteristics of the contemporary scientists. The problem of the preparation of these scientists is not of less importance. It can be discussed in a different paper and here only some of the points will be mentioned.

The production of scientific workers becomes one of the basic problems of the contemporary society which is being regulated and solved in a scientific manner by the scientific organizations. A key moment in the

human resources policy is the selection of young people who had shown certain skills that are needed for scientific work. The process should begin from the university (diploma work) and with the active participation of professors in order to start the creative activity of these young people and to ensure possibilities for demonstration of their talents. The contestant principle when selecting young scientists should be introduced everywhere. It eliminates the chances of subjectiveness. The urge should be streamed towards elimination of the current weaknesses and disadvantages of the contestant system which has to be improved and not restricted or annulated. In order to increase the quality of the scientific workers and their effective use, all newly hired scientific associates, assistants and specialist with university education in the scientific organizations and organizations for scientific services and implementation, should be selected by a contest.

The limited volume of the paper does not allow the problems for postgraduation role, educational courses, the continuous seminars, youth schools, individual qualification, national and foreign specialization, language qualification, doctor's dissertation, scientific reviews and scientific discussions, etc. for the preparation of contemporary scientists, for intensive development of the scientific potential of the personnel. It is necessary to emphasize that highly qualified scientists are prepared basically in the stationary scientific organizations. Many documents are right in emphasizing the importance of the quick professional and language qualification and long-term specializations with priority for the young scientific personnel. This is a leading principle in the human resources policy of the Bulgarian Academy of Sciences. The Academy developed and implemented a system for selection and qualification of young scientists and specialists with university education according to which all newly hired young people are given the conditions of qualification and evaluation which are very similar to these of the postgraduation conditions. It is a pity but it can be concluded that the situation with the young people in the Bulgarian science is not very satisfying. The percentage of young habilitated scientists is very small.

Science is a very dynamically developing system. Even the most qualified and knowledgeable scientists will fall behind if they do not make constant efforts for their improvement. Rendering the priority to the qualification of young scientists, this fact should not be oblivionized.

The talented scientists can demonstrate their abilities only when there is a high general scientific level of the collective. This is the reason why the differentiated fast qualification of the talented young scientists should be combined with the increase of the general scientific level of the whole collective.

However good and effective the system for selection and qualification of the scientists in the scientific organizations is, still there are a number of people who are not capable of scientific work. So the problem is what can be done to improve the effective selection system and to release the "plain masses" in science. Practice has shown that it is extremely difficult, especially with scientific workers with many years of work experience. There are many factors involved, including social ones. It is easier to get rid of incapable people at the beginning of their work. The system of attestation of the personnel provides a mechanism for releasing of incapable scientific workers even in later periods of their work experience. It is a pity that both regulated mechanisms for selection do not operate properly for the time being. Of course, we can think of other methods for selection: periodical dismissal and redirecting of part of the personnel in every branch, economic forces by limiting the salary, etc. but according to the author the current mechanism are good as long as they are put into practice. The problem could be solved by working with these scientists (especially the managers) to change their psychological attitude and elimination of the possible subjectiveness when solving the problem. .

It can be concluded that striving for high quality and efficiency of the scientific research is impossible without the preparation of highly qualified and active personnel whose professional characteristics correspond to the requirements of the contemporary science.

References:

1. Gospodinov K, Scientific Collectives, Publ. Science and Art, Sofia, 1993, 186 p.

2. Yosifov A. The Professionalization of the Scientists, Sofia, BAS, 1993, 152 p.

3. Kugel, S. A. Professional Mobility in Science. Publ. Misl, Moscow, 2003, 256 p.

4. Motroshklova, N. V., Science and Scientists in the Contemporary Capitalism, Publ. Science, Moscow, 1996, 256 p.

5. Naumov M, The Scientific Collective as a System, Publ. Science and Art, Sofia, 1975, 210 p.