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INNOVATIONS AND ECONOMIC DEVELOPMENT[1]

In a theoretical and practico-applicable aspect this paper has clarified the interaction between innovations and economic development. It has been proven that the positive influence of innovations on the economic development of open small-scale economies is determined by the specific public impact (governance) on the conversion of the new knowledge into a market product or service. A generalized analytical scheme of the main participants in this process has been suggested, the same being grouped in five basic interacting sectors: research and development, education, business, non-commercial and state, each of them having its international equivalents. It has been taken into account that the environment – legal, institutional and financial, renders substantial impact upon the efficiency of their interaction. The scheme has been proven by the practice of the European Union innovation policy. It is applied at the characteristics of the interaction between the innovations and the economic development of Bulgaria. It is used also in the analysis of the results of an inquiry carried out with 50 innovative organizations, the result of which allowed defining priorities for the national innovation policy.

JEL: O10, O31, O32, O33

Innovations as the Most Important Source of Growth in the Global Economy

In a theoretical aspect, the impact of innovations upon economic development becomes most clearly visible in the analysis of the relationship between them and the competitive power of the companies and economies on the one hand, and the trade balances on the other. Here it is proven that parallel to the acceleration of globalization, innovation has an ever-increasing influence on the condition of the economy.[2] This viewpoint has been defended in the context of two quite different prospects – that of the profit and that of the economic growth, which occupy a large prominent place in the contemporary and history literature. The contrary argument has also been considered, that acquisitions from innovations cannot be retained by their inventor within the framework of the national borders and hence, they are not important as a source of profit and growth. This argument is known in literature as the “apporpriability argument” (an argument for the rate of acquiring, appropriateness), i.e., for the innovating companies or countries it is difficult to absorb completely the return of the investments for innovations. The study shows that in the light of the newly arising consensus between the

[1] In the article are given the results from the research presented on different scientific forums in Bulgaria, as well as abroad (Athens, Brighton, Brussels, Luxembourg, Madrid and Washington). The author expresses her most sincere gratitude to all who have taken part in the creative discussions.

[2] Most of the arguments presented in support of this viewpoint are formulated in a series of collective monographs issued by the University Cambridge, following long-standing research carried out by an international team under the guidance of D. Archibugi.

economists (except some representatives of the neo-classical school) concerning the character of the technological change, the argument for apporpriability of results should not to be overvalued.

In general, the alternate conceptions for the sources of profit under capitalism can be grouped in two main schools of economic thought. According to the first school, the profit has two main sources. It is formed by the smaller expenses for salaries (either through their diminishing or through increasing the intensity of labour) and by the market position of the companies (a possibility to enforce higher prices in the markets for the end products and lower prices in the markets for intermediate products that are used as resources). Often both sources are mutually bound; for example, when through a contract with the supplier the sale is bound with lower prices, and that is possible is low salaries and worse labour conditions. The understanding that the profit is generated within the sphere of exchange and distribution, despite that it has also influence on the way the production is organized prevails in the economic literature. It has widely been accepted by the main tendencies in the macroeconomic and industrial economy, by the neo-Ricardians and most of the Marxists of the 20th century.

Following the logic of this school, multinational corporations (MNC), as well as states should lose from global competition. Their protected markets erode; the income is diminishing as a result of the global competition, while the profits are hampered. In such cases the obvious reaction is to transfer the difficulties to the workers, suppliers and distributors, whose contractual security is weaker.

The second economic school, in contrast to the first, one claims that profit comes from innovations. This is the position of Schumpeter and the contemporary representatives of the evolutionary school. At the same time they have strong classical prerequisites, especially in the works of Smith and Marx. Within the framework of this concept, the innovative MNC and states in the most dynamic centres are profiting, not necessarily on the account of others. Innovation is a game with a positive sum, in which the profits are not restricted in their kind.[3] In classical terms it means that they are generated in production and through long-lasting priorities in the same, rather than in the sphere of exchange and distribution – regardless that innovations have after-effects upon the way the markets are organized.

Broadly speaking, Schumpeter's concept concerning the creation of a profit is shared by the innovative companies that are based in the most dynamic centres and in a prevailing part of the internationally integrated MNC, in particular in sectors that are leaders in the field of innovations. It should be noted here that the scale of dynamism is not a function of the existing productivity level or technological potential, although it may be in a positive

[3] *Cantwell, J.* Innovation as the Principal Source of Growth in the Global Economy. - In: Innovation Policy in a Global Economy. Eds: D. Archibugi, J. Howells and J. Michie. Cambridge University Press, 1999, p. 227.

dependence on the degree of openness of an economy (since the bigger stimulus for export and competition in the world markets promotes the increase of the companies' dynamism). Japan, Korea and the other Far East economies generate higher levels of innovations than the USA, though they start from a lower level of technological potentials.

What are the mechanisms by means of which innovations lead to higher profits and owing to this, to higher competitiveness and growth within the framework of a Schumpeter-type understanding? In a most generalized way, causality may me modelled as a process in which the growth of salaries follows the trends of productivity raising (including the product and process improvements, which increase the cost of the products produced by a worker), but with some time lag. As a result of this time lag, the higher rate of innovations or productivity leads to a bigger share of the profit in the total income. If, however, salaries follow productivity they will grow quicker in case of innovations. This is in the spirit of the classical Smith and Ricardo tradition, where the higher rate of economic growth leads to higher salaries. With innovations, the living standard rises despite the small share of salaries in the total income and, as it was already mentioned, the creation of a profit through innovations is a game with a positive sum.

There is a number of cases, both in historical and contemporary aspect, that fit into this model. In the best innovative capitalist societies (Japan, Korea, Germany etc., in the post-war period) the productivity and GDP were high and the salaries grew quicker than in any other place. The model presumes also that those innovative economies show trends towards a permanently positive trade balance. One of the ways to explain the phenomena is that the growth of export is followed by an increase of import in the same manner as salaries follow productivity. Another explanation is that the trend to accumulate profits is stronger than the entire trend to save income. All those characteristics (export prevailing over import and high savings levels) are also characteristics of the more dynamic economies.

In reality profit is generated in both ways described above. In the first case, the focus is on the reduction of expenditure for salaries connected with the value of the result of the production of one worker with a given technology. In the second case, the objective is growth of productivity through changes in the production methods. Both cases may be linked and some authors make those links – for example at discussions of Ricardo and Marx, concerning the impact of the introduction of new machines on salaries. It could be proven, that in the long run the second kind of profit always has been more important than the first one (for example the ousting of the traditional Indian textile industry, characteristed by its low salaries, by the newly erected factories for cotton textile in Lancashire, Great Britain). Under the conditions of globalization the second type of profit becomes much more important than the first one. Provided the above argument is broadening, the MNC lose the first-type profits due to the loss of the privileges of

separate individual markets which become dependent on the international ones, but at the same time they increase their chances for creation of second-type profits through internationally integrated strategies for innovations.

Other proofs in support of this position could be presented, apart from the trend towards internationally integrated networks of MNC and the high degree of specialization in the 60'es of the past century. Here we refer to the growing potential for innovation creation of subsidiary companies within the framework of the respective corporate groups that provide those companies in most of the industries with new sources for higher profitability and growth. An additional proof are the new problems of competitiveness related to the reduction of the possibilities to generate first-type profits in the global economy, since to find separate market niches becomes even more difficult. The main characteristics of globalization since the end of the 60's till now has been the qualitative increase of the degree of international interdependence on regionally dispersed elements of the technological potential.

Companies that have traditions in the generation of first- type profits and retain their understandings about the sources of economic growth are facing difficulties. In response to erosion of the first-type profits, they begin to look desperately for new profits of the same type through various means of financial restructuring, sub-contractual agreements and renegotiations. One of those forms is the understanding of the "flexibility of the labour market", provided flexibility of the contracts through clauses for reduction of salaries in respect of worked off hours and intensity of work has been taken into account, in contrast to the creation of possibilities for training of workers to perform new tasks. Those piecework profits, however, offer limited prospects for steady growth. In the long run, the answer is linked to the adoption of an understanding of the beneficial influence of innovations upon the development and re-defining of strategies, regardless of the disadvantages of the accelerated impact of the higher intensity of renegotiations in a less regulated environment.

A confirmation of this conclusion is the new wave of strategic alliances between MNC, which is oriented mainly towards a joint technological development and inter-company co-operation in education and possesses a relatively lower motivation for joint utilization of market force, in contrast to the international pre-war cartels. This trend has been determined by the growing pressure of international competition presuming dynamic conditions (as a contrast to the static ones) of the surviving companies, which to large degree are guided by the necessity to permanently renovate their own potential and therefore its technological perfection. Such demarcation between the orthodox-type profits and the Schumpeter innovation-type profits is at the same time analogous to the demarcation between the static maximization of profits (an organization of the transactions in order to increase the current effectiveness and market presence) and the evolutionary search of higher profits (to a certain degree unexpected) which leads to some mistakes, and even to bankruptcies among "rational" agents, in the context of the research work of Nelson and

Winter. An immediate static result of the stronger competition is the reorganization of the contracts and the redistribution of income, which can be explained within the framework of the standard economic concept for maximization of profits, while its dynamic impact requires from companies to look permanently for higher profits through innovations – a search that has a place in the variants of the inter-company alternative ways of development.

Innovations on a national level create competitiveness in the global economy, which expresses itself in trade imbalances in the share of positive results in the more innovative economies and deficits in the less-innovative ones. In order to be surer in this statement, those imbalances can be partially explained also through other factors, in addition to those based on innovations differences in the industrial competitiveness. The impact of various macroeconomic policies, trade policies, financial factors and changes in the monetary policy have been taken into consideration, but it is astonishing how constant the trade imbalances of the economies have been since 1982 till now – a period during which the policies and exchange rates did considerably change. Moreover, in the long run, causality seems to move in another direction, for example, the overvaluing of the Japanese yen and undervaluing of the US dollar and the British pound, leaving aside the considerable brief fluctuations in the value of all currencies (in the above discussed model, the overvaluing of the currency may partially effect as a substitute of the quicker growth of salaries in local currency within the framework of a more dynamic economy).

Therefore, for the multinational innovative corporations the change to a strategy directed entirely towards innovations is the answer to the challenges of the globalization. This is connected with the way of the regulating the impact of the innovation processes on the economic growth and competitiveness within large corporations. A striking example in this respect is the leading pharmaceutical MNC “Pfizer”, which in 2001 spent 27% of its income on research and development. This holds good of the leading economies.

In contemporary literature, however, there is no answer to the question how the impact of innovations on the economic development of national economies is accomplished, especially on smaller-scale ones, and those facing negotiations to join the EU. Is it a quantity that results from the action of market forces or it follows the trends in leading MNC to implement competition-oriented, strictly defined innovation policy? Investigations show that in the developed countries similar processes have been observed like those in large corporations. The theoretical aspect of the problem of interaction between innovations and the economic development of less developed and smaller-scale economies practically has not been discussed. It is usually considered that smaller national economies leave this problem aside to be solved by the free action of market forces or rely on direct foreign investments as a stimulus for advancement. Is such an approach effective for our country? Before considering this issue we shall make an attempt *to define what innovation policy means.*

The establishment and implementation of such policy was understood as a problem of the economic development during the last decade. This was the reason for

a rather intuitive, or through a broad set of definitions, perception of this phenomenon, instead of stating a clear definition about it. To this end we are trying to clarify in brief the essence and the contents of the innovation policy, that will serve as a methodical basis for formulation of further practical measures.

The objective of innovation policy is to speed up the economic development and contribute to a higher competitiveness by creation of conditions for a quicker transformation of ideas into products, processes, services or a new-type of inter-departmental organization of companies. In other words, it aims at quick transformation of creation into profit. The formation of innovation policy presumes a new approach to the policy for economic development at macro and micro levels. As a phenomenon of conscious impact of society on the development (governance), this policy is an aggregate of principles, methods and forms of regulating the innovation activities, of the concerned organizational structures and human resources.

To be more specific, the innovation policy exerts an influence on: the economic development as an interaction between the scientific, technological and market potential; the possibilities for a successful performance of that potential; the management strategies; the real economic processes. As a result of this public impact, *the innovation process*, which is a process of transformation of the scientific knowledge into a marketable highly competitive product or service, undergoes a change from a specific problem of the development of science into a problem of society's development. Its perception as a linear process is changing to that of a system process.

The concrete tasks before the national innovation policy of the developed countries are bound to change of the conditions that are created by the national and institutional structural factors (e.g. economic, financial and educational), determine the rules and arrangement of the variants for innovations. Another direction is the perfection of the scientific and engineering (technological) basis, that is, the accumulated knowledge in the scientific and technological institutes being the basis for business innovations, for example through opportunities provided for technological education and scientific knowledge. A special accent has been put on the transfer factors, i.e., those that influence the effectiveness of ties, information streams and skills, on education, and on those, which are essential to business-innovation. The nature of the indicated factors or human agents is increasingly linked with the social and cultural characteristics of the population. Those tasks of the contemporary innovation policy are directed at creating a favourable impact of all dynamic factors – both internal and external, that promote speed up innovations in enterprises.[4]

[4] Innovation activities upon which influence is exerted in order to speed up the innovation process in enterprises are those scientific, technological, organizational, financial and trade activities that represent or lead to implementation of technologically new or improved products or processes. As far as the economic literature is concerned there exists a rather non-systematic presentation of the main types of innovation activities, we suggest the following groups:

Thus formulated, the tasks of the national innovation policy reflect the modern vision of the innovation process as a system, not as a linear process of transformation of ideas in a market product or service. At the same time, the national strategic priorities, the normative environment for their accomplishment, the organization and functioning of the relationships between the enterprises and academic university research units, the opportunities for financing of new projects etc., have been taken into account.

The set of measures for upgrading the innovation activity in the economy is accomplished through the application of different approaches.

How is the Interaction between Innovations and the Economic Development Accomplished?

There are two main concepts in the economic theory on the ways that innovations influence the economic development – the so-called "supply-push" and "demand-pull". With the first one, the main stimulus is "imposing of novelties in the supply" ("supply-push"). In this case the innovations are a function of what is considered to be necessary and possible to supply to the market. An example of such influence of innovations on the economic development is the policy of the countries from the former socialist block before 1989. Then the administration decided when, where, how and what is to be renovated, as well as the policy of the large transnational corporations, that through intensive commercials impose innovations on the world market. With

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- Research. It covers both fundamental and applied research with the experimental developments in the field of natural, medical, agricultural, social and applied sciences. This activity represents implementation of the creative developments in the fields of natural and engineering sciences, either systematically implemented or with the aim to increase the volume of knowledge and its utilization for new applications.
- Acquisition of machines and equipment for implementation of innovations – both of products and processes (including integrated software), with the aim to install and exploit them in enterprises.
- Acquisition of foreign technologies, including purchase of patents, non-patented inventions, licenses, know-how, trade marks, preparation of drawings and other consultancy services (except research) related to their implementation, together with the accompanying software that is not included in other place.
- Activities related to the project-programme provision and concerned services: consultancies concerning the technical provision with electronic-computation equipment; design and programming of systems; consultancies and services and programme security; activities related to data processing; repair and maintenance of office and electronic-computation equipment and other activities linked to the application of the electronic-computation equipment.
- Professional qualification and re-qualification of adults. Here are included activities related to training courses and other forms of acquiring specific knowledge and skills, without raising the educational degree and language training outside educational institutions.
- Market implementation of the novelties, which is linked to projecting activities, technical consultations, services and analyses, consultations and services in the field of law, management, book-keeping, trade activity, market research, as well as other business services.

With this approach, in contrast to that accepted in the practice, the factors that affect the innovation activity of the companies are tied not only "with the level of the research and development investments", but with all activities influencing the innovation activities of the companies.

the second concept, the stimulus of the market demand is a main factor for performance of innovations ("demand-pull"). The brightest example of the impact of the market as a stimulus for innovations are the large highly-developed countries with liberal economies, where competitiveness depends most of all on the speed of technological renovation.

The processes of the global technological change occurring place today, and the transition to market organization of the economy have no analogue in the economic history. They submit a series of new issues and respectively engender new methods for impact of innovations on the economic development. The issue for a systematic study of the ways in which the newly acquired knowledge transforms into a successful marketable product crops up, along with the identification of the main participants in the innovation process within the framework of national economies. The issue of the characteristics and assessment of their behavior, the degree of their mutual commitment and coordination, as well as their complete impact on the economic development is a call of the day. Last but not least is the issue about the impact of the level of economic development on innovations, the problem being subordinated to the former issue.

In other words, the accomplishment of the mutual commitment between innovations and economic development, more and more depends on the public impact (governance) linked to the systematic monitoring and direction of the movement of knowledge (new or newly acquired) along the road to its successful market performance.

To characterize this new type of mutual commitment one could use an analytical scheme in which the main participants will be grouped in five main sectors:

- Research and Development
- Education
- Non-commercial
- Business (mainly private)
- State
- Each of those sectors has its international analogue, which plays an ever increasing role for the development of small-scale economies.

With this analytical scheme, the legal, institutional and financial environment, as well as the behavior of the consumers, have a significant impact on the effectiveness of the interaction between the main participants in the innovation processes within the framework of the national economy. As an approach it can be used at the formation of contemporary innovation policy, subordinated to a model, which competitively ties the resources for accomplishment of innovations with the market demand. With this scheme, the solutions are not any longer sought in the choice between the two models of innovations' impact on the economic development - "supply-push" and

"demand-pull",[5] but in their combination and the ways of this combination; and the main participants are not only the state and/or the market.

The application of the above mentioned analytical scheme finds its justification in the examination of the innovation policy. The progress, achieved at its formation and implementation after the Action Plan for Innovation in Europe (1996), is based mainly on the systematic approach. Initially, innovations were considered as rather evolving from the complex interaction between a multitude of individual, organizational and environmental factors, not just as a linear trajectory of transformation of knowledge into a marketable product. Later accents were put on one or other interaction between the separate sectors of participants, depending on the estimate of its priority significance for the economic development, e.g., in the Fifth Framework Programme (FFP), adopted in 1998. This programme supports research and development, by setting the objective to intensify the relations between them and business. The innovations are determined as the main objective of the FFP, as a result of who innovation "cells" are set up in all subject programmes, in order to guarantee the utilization and transfer of newly created technologies. The criteria for assessment and the rules for the creation and dissemination of research results are developed for the same target. To this end, each research project includes a "plan for implementation of the technology", which allows to follow the results and assess their socio-economic impact. The FFP includes also the horizontal programme "Promotion of Innovations and Participation of the Small and Medium-Scale Enterprises (SME)", which envisages a series of measures for promotion and improvement of the policy, as well as specific measures for the SME.

Innovations have a particular significance for the economic development of the European Union, especially for structuring of its economic system. In the "Guidelines for Development of the Economy 2000", the European Commission recommends that the political objectives support the development of an economy based on the applicable knowledge in Europe; mainly through the creation of a suitable statutory framework, strengthening the participation of the private sector in the innovation development, promotion of the research co-operation and creation of high-tech companies, improvement of the operation of the markets for venture capital.

As a result of the application of new approaches, corresponding to the concept of the role of innovations in the economic development, the innovation policy becomes increasingly important and is transforming into a new horizontal policy linking the traditional fields –economic, industrial and research. Three basic approaches to the accomplishment of contemporary innovation policy within this framework can be determined:

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[5] This approach was applied in the study of a team of scholars from Central and Western Europe in the book "The Globalization of Industry and Innovation in Eastern Europe". From Post-socialist Restructuring to International Competitiveness (Eds. Ch. von Hirschhausen and J. Bitzer). Edward Elgar Publishing, 2000, where a conclusion is reached, that the protectionism in respect of the development of science and technologies in Eastern Europe is waste of funds, except the approach "supply-led", i.e. one based on supply, is replaced by the "demand-driven" – one based on demand.

- Creation of new administrative structures complying with the “system” nature of innovations;
- Setting up of positive thinking for the needs of innovations and carrying out a more intensive dialogue between science, industry and society;
- Development of strategy and mechanism for forecasting technical needs.

In support of the expressed position on a national innovation policy is the fact that all EU member countries, have already set up an innovation policy with its own defined specific features. For example, the French Innovations and Research Act of 1999, consists of several groups of integrated measures for encouragement of the transfer of technologies from research to economy and creation of innovation companies. Many countries have created innovation councils or have extended the role of their traditional scientific councils to the field of innovations. Some countries have made radical redefinition of the competence of Ministries, and even created Ministries, the purpose of which is to support innovations and it is clear from their names.

The recently developed initiatives in the field of the EU innovation policy stress upon an increasing volume of interaction between the main groups of participants in the process of transformation of knowledge into a competitive market product. Among them are the following initiatives:

- Stimulating the research carried out by the enterprises;
- Improving the financing of innovations;
- Encouraging the implementation of technologies and management of innovations in the SME.

New priorities appear with the accomplishment of the innovation policy. Among them are:

- Improvement of the co-operation between research units, universities and companies;
- Encouraging the grouping and other forms of co-operation between enterprises and other organizations linked to the innovation process;
- Promoting the establishment of new enterprises based on new technologies.

From the viewpoint of environmental improvement for transformation of knowledge into a basic motor of economic development, an increasing interest has been observed in the following fields:

- Simplification of the administrative procedures that the innovative enterprises face;
- Application of tax legislation and other indirect methods of stimulating innovations and research;
- Development of a strategic vision about innovations and research, as well as creation of positive thinking about society in this respect.

As a quantitative criterion for assessment of the successful implementation of the innovation policy, the European Union sets the achievement of EU average expenditure for research and development to the amount of 3% of the GDP before 2010. The prevailing part will be accomplished by the business sector. A basic tool for improvement of the financial environment for innovations is the Sixth Framework Programme (2002 – 2006). In contrast to the previous framework programmes, it does not include discreetly an "innovation programme". Instead, the innovation-related activities are distributed in working-programmes 1 and 2 – integration and strengthening of the European research area and its structuring.

The interaction and co-ordination between the participants in the innovation process have already been placed in the context of the trans-regional, trans-sector and interdisciplinary networks between the public authorities, economic subjects and social partners – those, put together, form the European innovation society.

In the light of the development of a new type of interaction between innovations and the EU economic development, it is interesting to see how this issue stands in a national context when applying the same analytical scheme.

Interaction between Innovations and the Economic Development of Bulgaria

As it has already been pointed out, for upgrading the innovation activity in small open economies, a substantial role is played by the organization, management and control of the society over the accomplished innovation activities and their impact upon the economic development. The national innovation policy and the approaches to its establishment and implementation determine the effective performance to a significant degree. During the past 13-year long period of transition, the Bulgarian state had not officially declared its innovation policy, but in practice the decisions taken exerted direct and indirect impact on the innovation activity.[6] From this viewpoint, in the accomplishment and implementation of the national innovation policy one can mark two periods: before 1989, and after that. During the first period the state had a substantial direct influence on the innovation processes in the country and was fulfilling the functions related to forecasting, co-ordination and control over innovation activities – from the generation of ideas within the framework of the fundamental research work till their supply on the market as a concrete product or service. The financing of those activities was a concern of the state.

The transfer of the main portion of functions related to management and financing of the innovation process took place from the state to business, BAS, universities, European and international private and public institutions during the second period. This change is a

[6] See *Chobanova, R.* Innovation Market in Bulgaria. - Economic Thought, 2001.

result of a politically defined transition to market organization of economic activities, accompanied by a considerable reduction of the volume of innovation activities. The formation of an innovation policy and the real innovation processes in the countries of Central and Eastern Europe were also considerably affected by the transition of the organization of their economies on market principles.[7] In Bulgaria those processes exerted even a stronger impact, since the innovation activities of enterprises slumped[8] and the difficult process of transformation of the national innovation system under the influence of the spontaneously formed national innovation policy made a stark.

Basically, the factors influencing the environment in which the main participants in the innovation process interact could be grouped in according to:

- The current processes of transformation of the national economic system;
- The processes of EU accession and those of globalization;
- The changes in the countries of Central and Eastern Europe, which were closely allied before the 90's of the past century through the Council for Mutual Economic Assistance, led to the collapse of the centraly planned economies and ruined the relations in and between them.[9]

Those factors to a great extent rendered a strong negative impact on the demand as a stimulus for the innovation behaviour of the companies. They led to the necessity of geographical reorientation of the external economic relations. During the first monitored period, the major part of the production in Bulgaria was to a considerably larger extent bound, in comparison with the other former socialist countries, to COMECON consumption standards, which became an obstacle to channel it quickly to other markets. The disintegrated or strongly shrunk market for Bulgarian production further limited the search for novelties for renovation of traditional national economy production.

Another consequence of the shrunk demand was that a major part of the scientific and technological infrastructure of Bulgaria strongly devaluated, losing its previous significance and prestige, and at the same time, as a result of the institutional restructuring, it became very fragmented. As observations carried

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[7] *Bitzer, J., Ch. Hirtschhausen*. Science and Technology Policy in Eastern Europe – a Demand Oriented Approach. DIW – Vierteljshrsheft, 1998/2, p. 139-148.

[8] See *Chobanova, R.* Market for Innovation in Bulgaria. – In: Innovation in Promising Economies, Eds. A. Inzelt (BUESPA) and L. Auriol (OECD). Budapest, Aula Publisher Ltd., 2002, p. 43 – 65.

[9] At the examination of a 70-year long period of the country's economic development up to 1997 in respect of the indicators import, export and production (measured by means of the produced national income), Prof. Al. Dimitrov reached the conclusion that the "Economic development of Bulgaria always has been directly connected with the foreign economic and trade relations" and that in the second half of the period "bringing closer of the trade curves with the curve of the production owing to the speedier (steep) development of trade and the growing openness of the economy – more import, respectively export per a unit of produced national income" was observed. (See *Димитров, Ал.* Външноикономическите отношения в условия на преход. - In: България и предизвикателствата на световното стопанство. Sofia, 1999, p. 19-20).

out by the Institute of Economics at the BAS show, the number and intensity of contacts between enterprises and scientific institutes and universities sharply declined. In this way both the volume and the speed of the movement of the knowledge streams went down, as well as the possibility to convert them into a well marketed product.

The described trends in the interdependence between innovations and the economic development of Bulgaria to a big extent do not correspond to the trends in the developed nations where they are a main source of growth and institutional interactions are subordinated to this approach.

What are the possible alternatives? The characteristics made about the interdependence between innovations and the economic development show that it is difficult to say the impact of innovation on economic development is definitely positive. From other side it is clear that a national policy on conversion of innovations into a main source of growth is missing

In the process of formulating national innovation strategy two starting concepts in respect to the main source of knowledge – the human scientific potential, are possible. The first one is subordinated to the market determined approach, where the scientific potential continues to shrink to a level where a balance between demand and supply will be reached. The main problem is connected with the competency which is notneeded for the current needs of the country. With the second concept alternatives are searched for national innovation policy from the viewpoint of preservation and development of the existing innovation potential as a source of economic growth in short and long-term aspects.

The first alternative for accomplishment of the connection between innovations and the economic development was performed with different intensity in our country during the 13-years of transition. In practice the state gave up the implementation of innovation policy with this alternative. Having in mind the reduced economic and innovation activities of Bulgarian companies during the past years, it is logical that such approach will lead to further shrinking of the scientific and technological potential of the country. In a short term forecast that means closing down and significant cutting down of academic staff, universities and established centres for technology transfer. Technologies will be purchased from abroad by funds acquired through export of resources. Such a policy has some economic justification under the conditions of budgetary restrictions. At the same time a broader strategic vision would estimate that today, when the economic prosperity is determined by the accelerated market performance of new knowledge, acquired and enriched under the conditions of a quick change of the technologies in all spheres of the public life, this innovation policy is hardly winning. The application of such an approach leads to the impossibility of competitive development, to “brain drain”, growing poverty and conflicts.

The other alternative is based on the preservation and effective utilization of the available innovation potential under the conditions of a market-functioning economy. The accomplishment of this alternative is associated with overcoming the impact of the very low innovation activity of enterprises, which is due to the

shrunk demand of innovation activities and the need for branch restructuring. In order to implement it in practice a scientifically substantiated policy for coordination and building is a must, as well as intensification of relations within the country's innovation system. In a shorter period, the application of such vision would have as an objective the preservation and development of the existing scientific and technological potential through its orientation towards research and development activities, the results of which are destined for markets of companies based in other more advanced industrialized countries, and/or through rechanneling to the second degree of higher education – the master's, and the Ph.D. degree. In this way, the existing innovation potential could be preserved and developed till the moment the locally based companies increase the search for innovation ideas due to better solvency. This means that the innovation policy has to be directed to provision of conditions for active utilization of the accumulated scientific knowledge and technological experience, to improvement of the national innovation product and development of new products, processes and services, which can be exported to other countries and/or encourage the demand of the same on the local and foreign markets. Such approach can be accomplished only in co-ordination of the state innovation policy and its integration with that of the European Union.

The Impact of Economic Reforms on Innovations in Bulgaria

On the eve of 2002 an assessment was made that the first stage of the process of transformation of the national economy had been completed. The position of the European Commission was the same, namely that Bulgaria had an operating market economy[10]. Now the main challenge is how Bulgarian economy will cope in medium-term prospective with competition and market forces in the EU. The innovations have to play a major role in this respect. Such viewpoint is supported also by the fact that the Bulgarian economy is in its sixth year of financial stability with a satisfactory macro-economic level.

The present state of our economy, from the viewpoint of the development of the market, is characterized by the fact that it is:[11]

- An operating market economy;
- Has reached a high level of macro-economic stability;
- Has an adequately developed market mechanisms which allow better utilization of resources;
- Good advance in the structural reforms, to allow market performance on the market, the restructuring of the financial sector and the privatization, setting up in this way a micro-economic basis for a steady growth.

[10] See the Report of the European Commission on the Progress towards Accession by Each of the Candidate Countries. Brussels, 9.10.2002, SEC/2002/1400-1412. The data are for 1997-2001.

[11] See again there, and in the Report of the European Commission on the Progress towards Accession by Each of the Candidate Countries. Brussels, 13.11.2001, SEC/2001/1744-1753.

In the light of the studied issue a question crops up: how do the economic reforms influence the country's potential to raise its level of innovativeness? What is the state of Bulgaria in comparison with other EU candidate countries?

The average pace of GDP growth in Bulgaria[12] is 2.0%, that is 3 times smaller than the pace of the leader among the candidate countries Latvia, which has 6.1%. In terms of average GDP per capita of the population, we remain among the most lagging behind, with 24% of the average European level for 2000, which considerably limits the potential for searching new products and processes on national level in comparison with other countries.

The structure of *consumption of the GDP* is unfavourable from the viewpoint of innovations. The relative share of the end consumption is still high, despite that in 2000 it dropped to 89.9% (0.8% down in comparison with the previous year). The export of goods and services, as well as investments has been a source of growth. The relative share of investments in the GDP grew in 2000 and reached 16.2%, but still this was insufficient from the viewpoint of accomplishment of the technological transformation of the production that will guarantee for the achievement of a stable economic growth.

The comparative analysis of the processes of inflation in Bulgaria and the other candidate countries reveals that the hyperinflationary shock at the beginning of 1997 had an exceptionally negative impact on the innovation activities. To be more precise, the expenditure of the business for research and development[13] during the period 1995–1999 decreased from 50% to less than 20% of the total R&D expenditure. The decreasing inflation has created new opportunities for improvement of the conditions for accomplishment of a larger volume of innovation activities, but its level is still comparatively high. The average inflation for the period 1997-2001 was 9.8% that is rather high, leaving Bulgaria in the eighth place among the thirteen candidate countries. Here, however, we have to take into account that Hungary (12.4%), Poland (9.9%), Rumania (46.3%) and Turkey (69.9%), are worse represented in terms of this criterion.

The level of unemployment has been a basic problem. It represents 19.9% of the workforce – the highest among all candidate countries for 2001. This, however, does not lead to higher productivity and is connected with considerable loss of human potential for innovations.

In 2001 the *Balance of Payments* was 1.7% of the GDP, being the only one favourable among the 13 candidate countries. This is a good characteristic of the macro-economic condition of the country, but state restrictions on the

[12] The quoted in this part data are from Eurostat and calculations of the European Commission using sources of the national economies.

[13] At us this term is more popular as scientific-research and development activity. Here we have to underline once more that according the adopted standpoint the expenses for R&D do not cover all expenses for innovation activity.

budget may be at the expense of the possibility to carry out a more active state policy, particularly in the field of innovations.

The *foreign direct investments (FDI)* are an important factor for higher innovation activities. For small-scale open economies they have decisive importance: to connect the national innovation systems with the international ones. Within the framework of our country, however, the FDI are not sufficient and cannot render substantial impact on the innovation development. For the period 1997 – 2001 Bulgaria ranked 5th among the candidate countries according to the indicator "net inflow of FDI as a percentage of the GDP" – 5.1%. According, however, to the indicator "rate of the FDI per person of the population", for 2001, the country occupied the 9th place – with 272 Euro, what is 8.4 times less than the rate of the leader – the Czech Republic – 2284 Euro. Recent data show that Bulgaria has emerged as a leader in respect to the FDI increase in proportion to the GDP among the candidate countries, having an increase of 180.9%. [14]

According to the presented arguments for the positive relation between the dynamics of the economy and its innovation characteristics, those facts allow building up some positive expectations for the country. At the same time, however, it has to be taken into consideration that the low level of the economic indicators does not give grounds to presume that results comparable with those of the leading countries will be achieved soon. Despite that the growth of the FDI stream is associated with the macro-economic stability and the stability of the Bulgarian currency in 1997, this period was characterized by a drop of expenditure financed by business for research and development. The internal sources for technological development are almost entirely ignored at the expense of a universal acknowledgement of the contribution of a comparatively limited amount of FDI.

As the positive experience of Ireland shows, the accent should be on the necessity of active national reactions of FDI on behalf of entrepreneurship, labour markets and the industrial configuration. That means that it is not enough to rely only on expectations for innovation development of the basis for new technologies, embodied in the growing rate of the FDI, but an accompanying national innovation policy be carried out.

In *privatization* certain success has been achieved, particularly in the banking sector, as well as from the viewpoint of the structural reform in the industrial sector, which is the micro-economic basis for carrying out of innovation activities. The rate of investments, however, still remains insufficient and financial mediation continues to be on a low level,[15] and this is an essential barrier before the development of the national innovation system.

The private business sector has an increasing significance for innovations in Bulgaria, which is connected with its dominant role in the country's economy. This

[15] See Report of the European Commission on the Progress towards Accession by each of the Candidate Countries. Brussels, 13.11.2001, /SEC/2001/1744-1753.

has been confirmed by the official data on investments, commented further, and by observations over the innovation activities of enterprises.

The value added accumulated by the private sector in 2000 had grown by 14.2% in comparison with the previous year. Its relative share reaches 69.3% of the value added in the economy, that is 3.9 points more than in 1999. In comparison with 1990, taken as the beginning of the transition to market economy, the total growth of the private sector is more than 3.5 times. During the period 1998-2000 it exceeded 60% in the field of services. As a result of the privatization in industry, the relative share of the private sector from 53.3% in 1999, has reached 68.2% of the added in it value in the year 2000.

The relative share of those engaged in private sector also grew. From 5.9% (241 000 people) in 1990, it reachedd 70.1% (2 063 000) in 2000, the absolute growth being 8.5 times.

The prevailing share of investments in the country also belonged to the private sector. In 2000 their relative share reached 62.1% of their total rate. Here, however, it has to be taken into account that this rate is still determined by the ongoing privatization of national economic structure determining enterprises.

As a result of the change of the proportion between expenditure for acquisition of fixed assets during the period after 1990, a change in the proportion between the sectors of the economy occurred. A lasting trend for the larger part of investments to be directed towards the sector of services was marked, reaching 60% in 2002. At the same time, investments in the rural economy and the forest industry dropped to 2.2% for the period 1995 – 2000.

It is necessary to take into account that the private sector quite more effectively absorbs the investment funds. The proportion between the acquired fixed assets and the expenditure for their acquisition is about 81%; for the public sector it stands at 71% and for the private sector at 87%.

The demand – internal and external, was not a stimulus for increasing the rate of production during the early period of transition and in that way exerted negative impact upon the innovations in the enterprises. After 1996, the period of accelerated drop was interrupted only in the year 2000. As a result, the rate of industrial production reached 83.5% of the level they had had in 1995, taking in mind that in 1999 it was 79% of the 1995[16] level.

The small and medium-scale enterprises played an important role in our economic development during that period, since they represented 98.99% of the total number of active companies in Bulgaria.[17] Their share in the gross value added grew from 22.4% in 1997 to 30.7% in 1999 and marked its highest rate in micro-enterprises. The generated gross value added in those enterprises had grown by 50% and reduced with the increasing of their size. The large enterprises registered a reduction of the gross value added in 1999 in

[16] According data of the NSI.

[17] According data from the recent studies of Bulecoproject Ltd. ordered by the World Bank.

comparison with 1998, what influenced their innovation activity. From the viewpoint of the representation of sectors, the SME were the most innovative in the field of the information technologies and software. The education and business services, which had an important significance for transformation of the knowledge into a market successful product was well-represented.

Productivity can be used as a generalizing economic indicator for level of innovativeness in the economy regardless of the fact that there are many factors that influence its level. In the first place it depends on the level of the production technology and the available equipment, as well as on the degree of its variety in the branches. The availability of highly qualified personnel cannot contribute to the significant growth of the productivity of labour, if the level of technologies and equipment is low. Exactly such is the case with our country, and data about this indicator have to be analyzed from those positions.

In 2001 one person engaged in the national economy produced about 4000 Euro of GDP at current prices, which is by 12% more in comparison with 2000. A process of acceleration of the annual growth of productivity in comparison with the preceding years had been noticed, the rates being respectively 6.4% for 1999 and 4.7% for 1998. The productivity of labour increased most quickly in the micro-enterprises, by 46%.[18] Within the framework of the economy, the growth diminished with the increasing size of enterprises. Labour in the branches connected with the production and supply of energy, gas and water was the most productive. As to the geographical location, the highest productivity was marked the SME's in Sofia, Bourgas and Varna, while the lowest was of that in Montana and Vidin.

The Impact of the Financial, Administrative and Legal Environment on Innovations in Bulgaria

The shortage of financial funds for investments has been the main impediment to the innovations in the Bulgarian economy.[19] As recent observations among the innovation enterprises in the country show, some quite positive trends were noticed during recent years. More specifically, the changes in the impact of the financial environment upon the innovation process can be traced through the change of conditions of the granted credits. After the grand crisis of 1996-1997, the commercial banks restrain from granting long-term credits to enterprises, including SME. Short-term credits have been granted for circulating means, after presenting guarantees to the amount of 150-200% of

[18] According calculations using data of the NSI and Bulecoproject Ltd.

[19] See *Chobanova, R*. Barriers to Innovation in Bulgaria. - In: Technology Transfer: From Invention to Innovation (Eds. A. Inzelt, J. Hilton). KLUWER Academic Publishers, 1998.

the rate of the requested credit. In 2000 the relative share of long-term credits grew almost 5 times in comparison with 1999. The positive trend still exists, marking a slight acceleration during the second half of 2002. Despite this, the search of credits is still hampered by the formal requirements of the banks, related to lack of enough guarantees, poor financial condition of enterprises and the lack of a marketing strategy.

The further measures for improvement of the effectiveness of the administrative and legal systems, from the viewpoint of raising the investments in the private and public sectors would promote their innovation activity and a sufficient power of competitiveness for surviving within the framework of the EU. More specifically, the expected measures are in the fields of:

- administrative procedures related to the sector of the enterprises, including the closing down procedures;
- improvement of the conditions for financial mediation;
- overcoming of obstacles to loan grants.[20]

The Impact of Foreign Trade on Innovations in Bulgaria

Foreign trade exerts a positive impact on innovations in Bulgaria, but far less than the expectations in the early 90's. More specifically, the foreign trade turnover during 2000 was 12 309.1 mln Euro. It had increased by 18.7% in comparison with 1999 and by 23.6% in comparison with 1998. The foreign trade balance was negative – about 1 278.7 mln Euro, this trend continuing till the present moment. The relative shares of imported and exported goods and services as percentage of the GDP reached, was 58.8% for export, and 64.1% for import. The European countries were the major partner of Bulgaria, occupying about 50% of foreign trade.

An indicator for the impact of foreign trade on innovations in the Bulgarian economy was the establishment of a link between the specialization of the country in the fields of research and export. The main export of the country included chemicals, fuels, machines and equipment. Among the leading groups of goods were fuels, clothes and wines.

The most innovative branch, in terms of the accomplished R&D rate, was the "production of chemicals and chemical products", a branch that concentrates 35.9% of all research work in the production.[21] This exerted effect on the formation of the main group among the leading commodity groups in Bulgarian export – lubrication oils, bicarbonate soda, medical supply,

[20] Report of the European Commission on the Progress towards Accession by Each of the Candidate Countries. Brussels, 13.11.2001, ESC/2001/1744-1753.

[21] A Developmet of the Centre for Economic Development. Sofia, 2001, www.ced.bg

toothpaste, polyethylene, ammonium nitrate, machine elements, electrical appliances, cosmetics, antibiotics.

The dependence between the size of the enterprises and the volume of their export is worth mentioning. The large enterprises possess a larger share in foreign trade. The share of the SME in export is insignificant,[22] which is connected mainly with non-tariff barriers, e.g. the lack of ISO 9000 certificates, which are held by not more than 320 Bulgarian companies, the lack of market channels, registered trade marks etc. With a good deal of conventionality, this allows to draw the conclusion that if not sufficiently innovative in terms of the dynamics of expenditure for R&D, the large companies retain their leading positions in foreign trade owing to the accumulated innovation potential.

Characteristics of the Innovation Process in Bulgaria

So far we have stressed mainly on the analysis of the interaction between innovations and economic growth, as well as on the factors that have an impact on it. Further we shall pay attention to the innovation process within the framework of the national economy. The analysis of this process is closely related to the clarification of the public impact upon its intensification. It is necessary to note that in scientific circles series of discussions have been carried out, but the scientific literature lacks studies which suggest and substantiate a unified system of benchmarks for monitoring of this process, though it has obtained the qualities of a system phenomenon.

For the purposes of our research we rely on the suggested analytical scheme, which in an institutional plan describes the track of knowledge from the laboratories and lecture-halls to its realization into a product, competitive enough on the market, as well as its impact on the consumer behaviour and the financial environment.

Due to the lack of enough data, we could shape 4 groups of indicators that characterize the innovation process in the economy:

- human resources;
- creation of new knowledge;
- dissemination and application of the new knowledge;
- Innovation finances, innovation results and markets.

Such approach to the selection of indicators for characterization of the innovation process corresponds to the EU practice for monitoring innovations, but differs in some characteristics due to the lack of respective data. Further on, in order to assess the state of the innovation processes in Bulgaria, a

[22] Annual Report of the Agency for SME. SME Report, ASME, Bulgaria, 2000, p. 59.

comparison with the values for the average European level and those of the 13 candidate countries has been made.

In compliance with the available data,[23] a conclusion can be drawn that Bulgaria was a leader among the candidate countries in respect to the pace of its positive change during the last three years of monitoring three indicators that characterize the innovation processes – the share of population with higher education, the ratio of direct foreign investments to GDP, and access to Internet. This, however, as it was underlined, is not in line with the positions of the country when comparing the absolute values, despite the fact that dynamism is a ground for positive expectations.

Let us consider the place of Bulgaria in comparison with the other countries by separate groups of indicators (see Table 1) and their pace during the last three years (see Table 2). The first group refers to the human resources, that are the country's innovation potential. Their contents and levels are as follows:

- New science and engineering (SsE) within the age class of 20-29 per 1000 people of the population. In Bulgaria this figure is 4.73 per mil. This level ranks the country second after Latvia. The level is almost the same as that in Hungary (4.49), Latvia (5.52), and Poland (5.9), but is more than twice lower than the European one - 10.26;
- The percentage of Population with tertiary education among the employed within the age class of 25-64. In Bulgaria they are 21.29%, which is almost identical to the average level in European countries – 21.22%. Our country is a leader in the growth of values by this indicator – 17.8%, corresponding to the average European level (17.9%), which is a good prerequisite for more successful performance of innovations in the economy;
- As to the percentage of the active population within the age class of 25-64, which still studies or further educates itself (participation in lifelong learning), there is no official data. For this indicator there are no official data for Bulgaria. Disturbing is, however, the data about the further education in big companies; it is carried out only in 62% of them, while the average level for others is within the range of 95 – 96%;
- The percentage of employed population in medium-high and high-tech manufacturing. For the country, the value of this indicator is 5.50%, while for the EU member countries the average level is 7.57%;
- The percentage of people employed in high-tech services (NACC 64, 72-73). For Bulgaria it is 2.71, while the average level in the EU is 3.61%.

[23] European Commission, European Innovation Scoreboard 2002, Cordis focus, www.cordis.lu

Table 1

European innovative scoreboard of the countries candidates for membership in the EU – 2002

Indi-cators	EU – aver.	Bulgaria	Cyprus	Czech Rep.	Estonia	Hungary	Latvia	Lithu-ania	Malta	Poland	Rumania	Slovenia	Slovakia	Turkey
1	10.26	*4.73*	-	4.00	*6.83*	*4.49*	*9.35*	*5.52*	6.12	5.90	-	13.10	-	*5.47*
2	21.22	21.29	*26.76*	11.59	29.42	13.96	45.03	18.15	*7.00*	11.73	9.97	14.12	10.66	8.00
3	8.5	-	3.1	-	5.3	3.0	3.7	16.3	*9.7*	5.2	1.1	3.7	-	*3.2*
4	7.57	5.50	1.03	9.16	4.79	8.80	3.18	1.72	*7.14*	*7.54*	4.91	8.74	6.75	*1.19*
5	3.61	2.71	1.83	3.22	3.38	3.24	2.01	2.19	*3.06*	-	1.43	2.71	3.03	-
6	0.67	*0.41*	0.20	*0.54*	*0.53*	*0.45*	*0.53*	*0.29*	-	0.45	0.10	0.68	0.24	*0.53*
7	1.28	*0.11*	0.05	*0.81*	*0.15*	*0.36*	*0.07*	*0.20*	-	0.25	0.30	0.83	0.45	*0.27*
8	27.8	-	-	-	-	*1.51*	-	-	-	-	-	-	-	*0.06*
9	152.7	3.2	6.0	12.1	6.9	16.1	1.1	2.5	-	2.3	0.9	20.6	5.9	-
10	12.4	0.12	-	0.58	-	0.30	0.54	-	2.60	0.05	0.04	0.50	0.19	0.02
11	44.0	-	-	-	*33.2*	-	*51.0*	-	*15.4*	4.1	-	16.9	-	*24.6*
12	11.2	-	-	-	*13.0*	-	*12.0*	-	*4.9*	-	-	-	-	*18.0*
13	3.7	-	-	-	*2.4*	-	-	-	-	4.1	-	3.9	-	-
14	0.242	-	-	0.021	-	*0.035*	*0.900*	*0.624*	-	0.045	-	0.150		0.130
15	1.73	-	-	-	-	-	-	-	3.68	0.23	-	-	-	0.69
16	6.5	-	-	-	*6.0*	-	-	-	37.8	-	-	-	-	*9.4*
17	37.7	-	-	-	*9.8*	*2.6*	3.0	*2.0*	-	8.0	-	24.0	-	-
18	31.4	*7.5*	22.1	13.6	30.1	14.8	6.8	*7.2*	25.4	9.8	4.5	30.0	16.7	3.8
19	8.0	3.8	-	9.5	9.6	8.9	5.9	*7.9*	*4.1*	5.9	2.2	4.7	7.5	3.6
20	10.1	*5.90*	-	-	-	*14.85*	*22.35*	-	*22.44*	-	-	-	-	*6.55*
21	30.3	26.4	23.7	42.6	53.2	43.4	20.6	29.1	84.7	21.3	17.7	15.5	24.2	4.7

Key for the indicators: 1- New S&E graduates (age class 20-29, per mil of the population); 2 – population with tertiary education (% of 25-64 years age class); 3 - Participation in lifelong learning (% of 24-64 years age class); 4 – Employment in medium-high and high-tech manufacturing (% of total workforce); 5 - Employment and high-tech services (% of total workforce); 6 – Public R&D expenditures (GERD - BERD) (% of the GDP); 7 – Business expenditures on R&D (% of GDP); 8 – EPO high-tech patent applications (per million population); 9 – EPO patent applications (per million population); 10 – USPTO high-tech patent application (per million population);11 – SMEs innovating in-house (% of manufacturing SMEs); 12- SMEs involved in innovation co-operation (% of manufacturing SMEs); 13 –Innovation expenditures (% of all turnover in manufacturing); 14 – High technology venture capital investment (% of the GDP); 15 –Capital raised on parallel markets plus by new firms on main markets (% of GDP); 16 – Sales of "new market" products (% of all turnover in manufacturing); 17 –Home Internet access (% of all households); 18 –Home Internet access (per 100 population); 19 – ICT expenditures (% of GDP); 20 – Share of manufacturing value-added in high-tech sectors; 21 –Inward FDI stock (% of GDP).

Source: European Innovation Scoreboard 2002, Cordis focus Supplement, Issue # 19, December, 2002, Candidate Countries (www.cordis.lu), p. 21. The data sources are different for the individual indicators, but prevail EUROSTAT, Labour force Survey, CIS, UNCTAD (p. 17). The data in Italic were collected by the group of the senior counselors on the innovative policy. The data are mainly for 2000 and 2001, but for some indicators they vary in broader borders (see again there, p. 22).

Table 2

2002 European innovative scoreboard of the countries candidates for membership in the EU – Trends*

Indi-cators	EU – aver.	Bulgaria	Cyprus	Czech Rep.	Estonia	Hungary	Latvia	Lithu-ania	Malta	Poland	Rumania	Slovenia	Slovakia	Turkey
1	13.7	*7.2*	-	-	*38.2*	*-14.4*	*53.2*	*0.1*	1.3	-	-	-	-	-
2	17.9	17.8	*16.4*	7.1	-0.1	5.7	7.4	4.2	-	0.4	14.2	-1.1	8.2	-
3	21.4	-	-	-	-7.0	-1.1	-7.5	7.9	-	-	22.2	-	-	-
4	-2.1	-	-4.6	5.1	20.0	6.6	-15.4	105.7	-	-	-21.4	1.6	2.1	*2.0*
5	18.3	-	24.3	-0.1	22.8	17.5	-11.9	8.4	-	-	-8.6	30.4	10.5	-
6	-2.0	*11.5*	-	*26.0*	*-2.8*	*10.5*	*17.9*	*-14.6*	-	5.9	-34.1	-10.5	-27.0	*57.8*
7	5.4	*-37.4*	-	*12.9*	*26.0*	*26.4*	*-30.4*	*83.7*	-	-14.0	-43.6	9.7	-30.3	*85.8*
8	97.2	-	-	-	-	*9.6*	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	43.9	-	-	-	-	-39.3	-	-	-	49.9	-	-40.1	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	--	-	-	-	-	-
14	-	-	-	-	-	*97.7*	*6.0*	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	271.4	-	-	-	--	*175.3*	-	-	-	-	-	-	-	-
18	155.3	*226.1*	99.1	154.2	148.8	199.0	189.4	*89.5*	255.2	106.3	83.7	164.3	63.7	153.3
19	14.8	17.5	-	33.8	13.8	32.2	.	-	-	40.5	34.7	22.6	38.9	1.9
20	23.2	*25.8*	-	-	-	*18.3*	.	-	*-5.6*	-	-	-	-	*37.0*
21	99.3	180.9	-3.3	86.8	117.1	25.1	89.0	26.5	97.4	83.6	70.2	28.1	195.1	34.3

* The paces were calculated as a percentage change between the data for the last year, for which they are existing, and the average of last three years, after a one-year lag. Owing to short time lines, for some indicators were used other averages. See European Innovation Scoreboard 2002, Cordis focus Supplement, Issue # 19, December, 2002, p. 23

Key for the indicators: 1- New S&E graduates (age class 20-29, per mil of the population); 2 – population with tertiary education (% of 25-64 years age class); 3 - Participation in lifelong learning (% of 24-64 years age class); 4 – Employment in medium-high and high-tech manufacturing (% of total workforce); 5 - Employment and high-tech services (% of total workforce); 6 – Public R&D expenditures (GERD - BERD) (% of the GDP); 7 – Business expenditures on R&D (% of GDP); 8 – EPO high-tech patent applications (per million population); 9 – EPO patent applications (per million population); 10 – USPTO high-tech patent application (per million population);11 – SMEs innovating in-house (% of manufacturing SMEs); 12- SMEs involved in innovation co-operation (% of manufacturing SMEs); 13 –Innovation expenditures (% of all turnover in manufacturing); 14 – High technology venture capital investment (% of the GDP); 15 –Capital raised on parallel markets plus by new firms on main markets (% of GDP); 16 – Sales of "new market" products (% of all turnover in manufacturing); 17 –Home Internet access (% of all households); 18 –Home Internet access (per 100 population); 19 – ICT expenditures (% of GDP); 20 – Share of manufacturing value-added in high-tech sectors; 21 –Inward FDI stock (% of GDP).

Source. European Innovation Scoreboard 2002 …, p. 17, 23.

An increase of the values for the last two indicators could be expected, since the level of supply of people with higher education and trained personnel in the field of high-tech production and services exceeds the demand for the same. Naturally, provided the rate of "brains outflow" does not establish market equilibrium within the framework of the national economy.

The other group of indicators of the innovation process characterizes the sources and results from the creation of new knowledge in the country. As regards content and values they are as follows:

- Public R&D expenditure as a percentage of the GDP (the indicators GOVERD + HERD), which means they are connected with the R&D expenditure of the state and the higher education institutions. Owing to the specificity of the Bulgarian innovation system, the BAS is included, too, being the main producer of scientific results in the country. The value of this indicator for Bulgaria is 0.41, which is about 2/3 of the average European level (67%). Our country ranks third in the second group of candidate countries, next to Latvia and Turkey.
- The business expenditures on R&D as a percentage of the GDP (the BERD; business sector includes both sectors: industry and services). The Bulgarian business with its expenditure for R&D in the amount of 0.11%, as percentage of the GDP, shows 10 times less efforts in the field of innovations than the average European level which is 1.28%. As already mentioned, the values of this indicator sharply worsened after the 1996-1997 crisis;
- Registered patents in the high-tech classes by the European Patent Office per million population (pharmaceuticals, biotechnologies, information technologies and space research). As far as data about this indicator is missing, we could use the data about an alternative indicator – applications for the issue of a patent in the European Patent Office per population of one million. By this indicator, Bulgaria has 3.2, and ranks second in the second group of countries applying for EU membership, after Slovakia; far behind, however, from the average European level (152.7). The number of applications for high-tech patents in the USA Patent Office is 0.12 per a population of one million, which is 10 times lower than the average for Europe (12.4).

The transmission and application of new knowledge as an element of the innovation process is characterized by the following indicators: percentage of the SME's that innovate in-house; percentage of the SME's that cooperate in the accomplishment of innovations; expenditure for R&D in the production sector as percentage of the total turnover. For Bulgaria there is no official data about those indicators, because national observations on innovations have not been carried out yet. Here, without pretending for representativeness, results of latest observations, containing data about 2002 indicators have been analysed. Generally, the observation reveals that most of Bulgarian enterprises are innovative, but innovations are tiny, mainly due to the shortage of funds for innovation projects.

Most of the innovative enterprises (75.5) spend money on R&D in the amount of 1 or 4% of the total turnover, but the levels of the prevailing part of them

are closer to 1 than to 4%. The small-scale enterprises are more innovative and co-operate better among themselves on the accomplishment of innovation projects.

Generally, the small companies present themselves better in respect of the transmission and application of new knowledge for the launch of new products and services in the market, but obviously the intensity of those processes is considerably lower than in the EU.

The fourth group of indicators for the innovation process in the national economies refers to the innovation finances, innovation results and the markets.

The first indicator is the proportion between the high-tech venture capital investments in the technological companies as a percentage of the GDP. The average European level is 0.242. Having in mind the analysis, carried out, the risk capital in Bulgaria can be estimated as slight petty.

The capital rised on parallel markets plus by new firms on main markets, as a percentage of the GDP for the country, also could be neglected. However, the average value for the EU is 1.73.

Products which are “new market”, as a percentage of all turn over in manufacturing industrial companies are in the average of 6.5 ror the EU.There is some data for Bulgaria which has been obtained from unrepresentative excerpts. The results vary considerably depending on the sector, and a conclusion for the condition of the country could not be drawn.

Another group of indicators is that about the results of the impact of contemporary innovations. They are connected mainly with the use of modern information and communication technologies.

In the first place here is the home Internet access indicator, as a percentage of households. For Bulgaria it is 7.5%, and we are in the third place in the second group of candidates, next to Slovakia and Malta, but lag behind in comparison with the average EU level of 37.7%. The level of this indicator, however, is determined by some nationaly specific factors as the age profile of the population. For example, Bulgaria has a comparatively big share of elderly population, which, due to its low income cannot afford to purchase a computer for the household.

Another indicator in this group is the share of expenditure for information and communication technologies (ICT) as a percentage of the GDP. Its level for Bulgaria is 3.8, which is two times lower than the average European level. It means that resources allocated for ICT does not provide enough grounds for infrastructure for information society development are not sufficient.

To this group of indicators belongs also the share of the manufacturing value-added in high-tech sectors. For the country it is 5.90, i.e., two times lower than the average level of the candidate countries of the EU - 10.1.

The last indicator is the ratio inward FDI stock / GDP. For Bulgaria it is 26.4, which is close to the average EU value of 30.3. The country is a leader in terms of trends, but, as it was mentioned, this fact has to be commented in compliance with the national specific nature and absolute figures.

In relation to the analysis of the condition of the innovation processes in the Bulgarian economy, the following conclusions can be drawn:

Bulgaria human resources good enough to accomplish innovations, but public and private expenditure for R&D do not allow their effective utilization for creation and application of new knowledge in the economy. The small companies are better represented in the spread and application of new knowledge than the micro and medium-scale companies. The insufficient financial funds are the main barrier to the more intensive application of new knowledge. The access to existing tools and the effectiveness of their utilization are insufficient for stimulating a higher pace for business renovation. Most of all the private SME from the branches of the information and communication technologies, software, education and business-services contribute to a positive characteristic of the innovation activity in Bulgarian economy. An important task before the innovation policy of the country is the development of an intensively operating network of contacts between the Academy, the industry and universities, as an element of the establishment of a national innovation system that creates competitive environment, stimulating the demand for innovations by the business sector and consumers outside the country.

Measures for Intensification of the Innovation Processes through the Eyes of the Business' Representatives

In addition to the above mentioned conclusions and proposals for determination of priorities that the national innovation strategy faces, innovative companies and their representatives have an important role to play.

Using the suggested analytical scheme, an inquiry was prepared and carried out in the end of 2002 among 50 representatives of the innovation private business in Bulgaria, with the purpose of making an assessment of the innovation environment and determining the priorities of the country's innovation policy. More specifically, there were three tasks to be fulfilled:

- To clarify the impact of the legal and economic environment in the country on the accomplishment of business innovations;
- To define more accurately the opinion of the participants from the private sector concerning the present policy and the specific measures that influence the innovations;
- To define the viewpoints regarding the networks and mechanisms of diffusion in the national innovation system.

The observation included 50 executive directors or managers from research or private companies (2/3 of the observed) and representatives of non-commercial organizations, expressing the interests of the private sector-stakeholders (1/3 of the excerpt).

The criteria for the excerpt were that the observed companies meet at least one of the following requirements in order to be qualified as innovative:

- To have their own research unit and/or development activities within the framework of the company;

- To participate in nationally financed schemes for innovations or for research and development;
- To be technological leaders at national or international level;
- To co-operate within the framework of structures supporting the innovations.

The first group of questions was related to the innovation environment and the development of the policy. The general assessment of the *legal and administrative framework* for accomplishment of innovations by the business was rather negative or neutral, although there were some quite positive assessments of the impact of the legal environment upon innovations. According to 30% of the representatives of the business, the new high-tech companies still are experiencing specific legal and administrative difficulties. The existing legal framework for business, which desires to develop and commercialize ideas for new products and/or services, is considered as favourable by 58% of those inquired, and as unfavourable – by 16%. The remaining 26% believe that the assessment depends on the concrete case and field of business. The influence of the public institutions through provision of enough information and support to enterprises in respect of the rights of intellectual property (patents etc.), is rather negative, although 56% of those inquired stated that it depended on the particular case, and a generalized conclusion could not be made. According to 70% of those inquired, the taxation system does not provide incentives for industrial (technological) research in the companies and respectively, does not stimulate the innovations in them.

The economic and financial environment for accomplishment of innovations has its positive and negative sides. According to 58% of those inquired, the macro-economic environment renders a positive impact, but 60% believe that the banks and investors still are not ready for innovative efforts to a sufficient degree. According to 94%, the new high-tech companies have not an easy access to risk capital and capital to initial start a business.

54% of the inquired reckon that the *educational institutions and those for vocational training* have enough potential to provide highly qualified scientists and engineers. The remaining 46% give a neutral answer. 64% believe that the development of creative and innovation skills is a priority of the programmes for education and training.

The representatives of business give mainly neutral or negative assessments for the impact of government measures in the field of innovation policy and *publicly financed programmes*, as well as for the influence of the infrastructure on the innovation activities. They are unanimous to a high degree – 74% of the inquired believe that the applied research in Bulgaria is not sufficient. Skilled personnel gave prevailing answers of “it depends” – 48%, and 18% estimate the level as “sufficiently good”. The remaining reckon that it is unsatisfactory. The assessments of enterprises’ access to sufficient amount of consultancy services (innovation consultants, technological brokers, etc.), that support their innovation activities, are negative or neutral.

The state of the *innovation networks* and the intensity and quality of the ties between them, are an important characteristic of the national innovation policy.

Those inquired, though a small majority, consider that the enterprises are not predisposed to innovation activities and acceptance of an economic risk (36% v. 18%), but most of them answer that such behaviour depends very much on many and various factors and could not be generalized. A conclusion is drawn that Bulgarian enterprises have not the necessary access to high technologies – in terms of finances and know-how. The innovation performance of enterprises, the representatives of which were inquired, is evaluated as "good" only by 36% of the inquired, and as "unsatisfactory" by 46%. According to the rest of them, it depends on the criterion used for the evaluation (time, competitors, international level). The general evaluation of the level of investments in further education of the personnel with the objective to acquire and apply new technologies is that they are not satisfactory – 56%. The contribution of the FDI as an important source for transfer of technologies in the state owned enterprises – 54%, is estimated as negative.

Most of the inquired (96%), determine the *inter-company co-operation* (with suppliers and distributors) as an important mechanism for transfer of technologies and assiss the innovation activities. They are unanimous that the co-operation between business companies and research companies potentially offering the respective applied industrial research is essential for the innovation activities. They support also the assertion that the state provides series of stimuli to foreign enterprises for operation in the country, but they do not make efforts to transfer new knowledge to companies possessed by local owners.

Priorities of the National Innovation Policy According to the Business Community

As it was mention before, the innovation policy of the enterprises and economy depends to a high degree on the representatives of the innovation business. A generalized picture of the results of their observations carried out considers priorities of the national policy. Those inquired were unanimous about:

- The financing (through grants and loans) of programmes for supply of new technologies;
- The grants for quality certification and other techniques for innovative management;
- The financing of research centers (academic, branch and for specific technologies) for development of services, e.g., supply of the best high-technology equipment, additional personnel etc.;
- Support of the establishment and development of interface for services between the universities, academy and industry, e.g., assisting the commercialization of research results, transfer of technologies etc.;
- The financing of innovation projects that include the cooperation between different enterprises (e.g., for stimulating the development of the so-called "Clusters");
- The financing of projects that include co-operation between enterprises accomplishing FDI jointly with local companies (The so-called subcontractors);

- The financing of "Incubators" or technological parks (to host "spin-offs" or high-tech companies.
- The financing of services related to consultations on the issues of innovation management or technological assistance to companies (e.g., special advisers in research centers);
- The innovation cheques "that allow companies to provide service sought by external organizations.

Conclusions for Further Theoretical Research

The main theoretical conclusion is that the positive influence of innovations on the economic development of open small-scale economies is determined by the global market as well as by the specific social impact (governance) on innovation processes. It means that observation and regulation of the movement of knowledge from its creation (or acquisition) to its market performance manifestation has become an important policy making issue.

The solution of this problem presumes coordination between the representatives of the five basic groups participating in the formation and implementation of the innovation policy – R&D and educational sectors, business, non-commercial sector and the state, and their international analogues.

The effective impact of innovations on the economic development is directly connected with the legal, institutional and financial environment that affects the behaviour of all economic agents for a quick transformation of the available and newly created, knowledge, into modern products and services competitive enough on the national, European and world markets.

Basic Policy Making Considerations

The conclusions that can have practical application when accepting the proposed approach for public impact on the process of the transformation of knowledge into competitive products and processes can be generalized in the following way:

1. The effective utilization of the available and developing innovation potential aquires a decisive significance for the contemporary economic development. The formation and implementation of a national innovation policy, in conformity with the specific features of the country, is a growing necessity.

2. A change in the behaviour of all economic agents towards an accelerated transformation of the available and newly aquired knowledge into contemporary products and services, which are competitive on national, European and world markets, is required. The innovation policy directed towards the creation of mutually beneficial permanent relations between enterprises, academic teams and universities will contribute for raising their innovation activity and for the contemporary development of the Bulgarian economy.

3. Not only the state has to be an author and main actor at the accomplishment of the innovation policy. The trends and conclusions laid down

impose a new type of strategy for its formation and accomplishment. That means that the state, the business sector, the BAS, universities and their units, have to assume their responsibility for the formation and implementation of the national innovation policy. The state coordinates of the main activities of those actors.

4. The decisive role of business for the transformation of innovations into a motor for the economic development could be brought to fruition also through changes in the system of corporate governance. The prevailing form of majority in most cases is an obstacle to the innovations in the business sector. The stakeholders in the accomplishment of corporate governance, is a prerequisite for the implementation of the important role of the business for its prosperity.

5. The state has to formulate and defend a policy of development of the national innovation system that corresponds to Bulgarian traditions and peculiarities, looking also for the support of European institutions. This means a coordinating role with the aim of preserving and developing the existing scientific and technical potential, the creation of a competitive environment for ideas, renunciation of normative institutional restructuring that leads to fragmentation of established scientific centres as BAS. The financing of research projects by the EU is of paramount importance to the innovation development, especially of those that contribute to the solution of concrete issues related to the accelerated upgrading of the competitiveness of Bulgarian enterprises and the practice of the state management.

6. At this stage the main initiator of national innovation policy is the state. In this respect it has to undertake measures to support the relations between scientific units, higher schools of education and enterprises (as well as between themselves) – the so-called centres for transfer of technology, which most often are representatives of the non-economic sector. A non-government body in which the state will participate could manage the overall coordination.

7. As a criterion for the effectiveness of the national innovation policy in terms of expenditure made, we can point out: the rising of expenditure for research and development – up to a level 1.5-2% of the GDP over a period of 2-3 years. The 1984 level of 2.5% should be reached by the year 2006. The tentative proportion between the sources of funds that can be achieved within three years may be: 35% – enterprises, 35% - state funding, 10% - higher education, 5% – non-commercial organizations (mainly of the enterprises) and 15% from abroad. A special World Bank loan initiated by the government could give a fresh impetus to this end.

Those measures will render positive impact upon Bulgaria's decision to join the European Union as a full-fledged member and achieve an average 3% level of expenditure of the GDP. In addition, the higher dynamics combined with better coordination of activities by the main participants in the innovation processes in Bulgaria could contribute to an accelerated competitive development of the economy and lead to a higher living standard of the population.

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