Regional and Business Studies (2011) Vol 3 Suppl 1, 683-697
Kaposvár University, Faculty of Economic Science, Kaposvár

INDUSTRIAL GROWTH, INVESTMENT BEHAVIOR AND INNOVATIONS IN BULGARIA

Diana KOPEVA, Dimitar BLAGOEV, Nikolay SHTEREV
University of National and World Economy, Bulgaria
dmblagoev@abv.bg

ABSTRACT

This paper traces trends in industrial growth against the backdrop of the overall economic growth in Bulgaria under the influence of the ongoing economic reforms and evaluates them against the performance of macro-firm data. Bulgarian industry has lost many of its positions since of the beginning of 1990s. Structural reform during the transition period resulted in lost markets, lack of innovations, low product quality, and inefficient organizational and production structure. The analysis reveals that a phase of growth revival has begun in the overall economy since the beginning of the twenty-first century. Some industrial sectors demonstrate significant and stable growth based on technological innovation, increased labor productivity and efficiency, and increased investments. In this paper we claim that the problem is not deeply studied and only a few economists have done research on it since Bulgaria's accession to the European Union. The analysis reveals different factors influencing Bulgarian industrial growth before and after accession to the EU. The assessment of the endogenous and exogenous factors determines the key role of innovation, R&D, and human resource development, and presents the interrelation between innovations, investments, and industry growth. Section one of the paper is an Introduction. Section 2 briefly presents the state of art and methodology. Section 3 focuses on analysis of investment and innovations behavior in Bulgaria for the last eight years (2000 – 2008) on the basis of macro and firm-level data. Section 4 presents possible scenarios, and section 5 gives the conclusions of the study.
Keywords: innovations, investment behavior, industrial growth Bulgarian economy

INTRODUCTION

Industry growth is desired of any government policy but it should be an efficiently driven process. Bulgarian industry has lost many of its positions since of the beginning of 1990s. Structural reform during transition period resulted in markets' lost; lack of innovations, low product quality, inefficient organizational and production structure. This has changed after the end of the economic crisis of 1996.

In the paper we claim that the problem is not deeply studied and only a few economists do a research on it after Bulgarian accession to the EU. The analysis reveals different factors that influenced Bulgarian industrial growth before and after accession to the European Union. The assessment of the endogenous and exogenous factors determines the key role of innovation, R&D and human resource development, and presents the interrelation between *innovations – investments – industry growth.*

Section one of the paper is Introduction. In Section 2 briefly is presented state of art and methodology. Section 3 focuses on analysis of investment and innovations behavior in Bulgaria for the last eight years (2000 – 2008) on the basis of macro and firm level data. Section 4 presents possible scenarios, and in section 5 are given conclusions of the study.

STATE OF ART

In the literature there is a vast interpretation of the growth and dynamic. According to Krafft (2006) there is a different explanation of the industrial dynamic and the role of industrial growth. One of the most common definitions treats that the industrial dynamic is a result of the increasing ability to enforce the industry evolution (*Forrester*, 1961) for a long-term periods. The industrial dynamics does not only describe and analyze the current industrial structure, but these market driven factors that can change economic structures over time (*Krafft*, 2006; *Dietrich*, 2006).

So, the adoption of "evolutionary approach" of industrial dynamic is fundamentally set by Schumpeter's entrepreneurs. Thus, the existence of "entrepreneurial governance" as an economic phenomenon changed the industry from the inside. Not surprisingly, managing the endogenous factors for dynamic are the same which are the major challenge for industrial growth (*Krafft*, 2006).

Bo Carlsson and Gunnar Eliasson (2001) define that the economic growth as a result from the interaction of all market actors. So, the economic growth looks like a continuously enlargement of present and potential markets. Therefore, the economic growth is measured with the growth of GDP in many cases (*Ju et al.*, 2009).

According to definitions both industrial dynamic and economic growth, are macroeconomic phenomena which are driven by micro level factors. Evidences and proofs for both processes can be found on national, sectoral and micro level. Therefore three essential steps to reveal the industrial dynamic driven factors are defined:

- To analyze changes of national growth indicators as: GDP and GNP
- To analyze some key structural changes as: level of competition; level of labor force absorption; level of innovation.
- To analyze intra-firm changes which are directly connected with economic growth

Essential for finding the industrial dynamics out is an ability to explore the link between economic inputs and outputs. So we need to focus our attention on "the systemic characteristics" of industrial development. We should mention that economic growth is not a result of single firm activities, but a result of market players' activities (*Ju et al.*, 2009).

ANALYSIS OF INVESTMENT AND INNOVATIONS BEHAVIOR IN BULGARIA FOR THE LAST EIGHT YEARS (2000 – 2008)

Methodology

It is obvious that industrial growth can be traced by studying changes of macroeconomic indicators (GDP, GNP, investment expenditures). These macro-economic indicators give the perspectives for economic development.

Structural indicators (labor, competitors, consumers, etc.) have both: quantity and qualitative dimensions. The national statistic provides information about quantity changes, but does not present data for qualitative changes (For example: product quality; product and technology innovations; labor competencies; market information etc.). The industrial development is dependant of the factors as follows: the innovations in new products and technologies; of selection dynamic markets for operation; of capacity to retain "winners" and remove "losers" from the market etc. (*Eliasson and Eliasson* 1996; *Eliasson* 1996; 1998; 2000; 2001; *Eliasson and Taymaz* 2000).

In the study are summarize several quantity indicators for measuring the growth effects. But the most useful indicators are those which express a long-term growth effects. Therefore suggested indicators are built over the market and investment indicators ratio according to purpose of the analysis.

The most useful indicators for analyzing Bulgarian industry growth are based on the relative variation of the observed economic indicators such as follows:

- Market variation (*Formula 1*) – this index measures the direct changes of the total market potential. It shows not just a quantitative change of the market but a qualitative one. It is important for national economy to keep this relative index growing in a long term period.

$$\text{Market variation}_t = \frac{\text{Industry}_t}{\text{Industry}_{t-1}} \quad (1)$$

  where ***t*** is the year of observation.
- Quality market variation (*Formula 2*) – this index measures the qualitative changes through the industrial markets. It shows the change of industrial value added. This index is expected to grow for a long term period according to the best practices.

$$\text{Quality market variation}_t = \frac{\text{Industrial Value Added}_t}{\text{Industrial Value Added}_{t-1}} \quad (2)$$

- Factors variation (*Formula 3*) – there a lot of variation of this factor index. Each one depends on the observed impact factors. Most common factors are: rate of investment; rate of newcomers in industry; rate of innovation's expenditures, etc. The change of mentioned indexes should bring out a positive change in market indicators. Therefore it's a wrong hypothesis to look over their continuous growth.

$$\text{Factor X variation}_t = \frac{X_t}{X_{t-1}} \quad (3)$$

  where ***X*** is different industry's growth factor.

Analysis of investment and innovations behavior in Bulgaria

There are several studies focused on Bulgaria and Bulgarian economic changes before and after the EU accession. The questions which interest most economists are: What changes are become in Bulgarian economy over the pre-accession period? Is there enough ground for fast industry growth? Does the pace of industrial

growth is kept after the accession? What are the main characteristics of industrial development and future development paths?

To answer these questions, the analysis is based on the growth indicators.

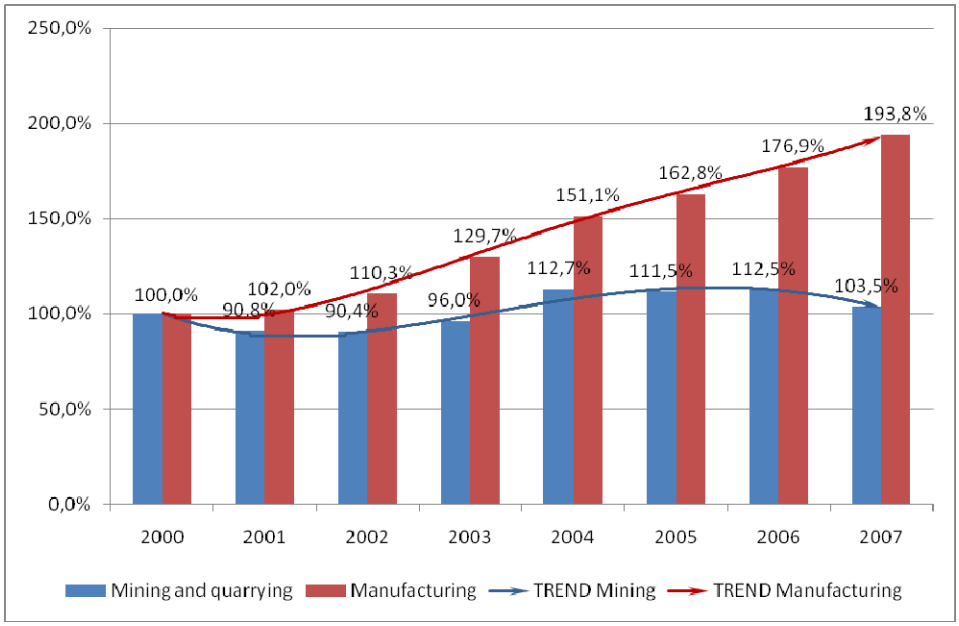
Is there a real industry growth?

The Bulgarian national statistic data shows that there are enough evidences for industry growth. Data analysis should be based on differentiation of industrial sectors as follows: Mining and quarrying; Manufacturing; Energy production.

According to market variation index (*Figure 1*) there is quite strong differentiation between sectors Mining and Manufacturing. The Mining sector shows a slight change in sells over the observed period. Vice-versa the Manufacturing is sustainable growing sector. So industry growth of Bulgarian economy is based to Manufacturing according to this picture.

Figure 1

Market variation of industry growth (measured by total sells)

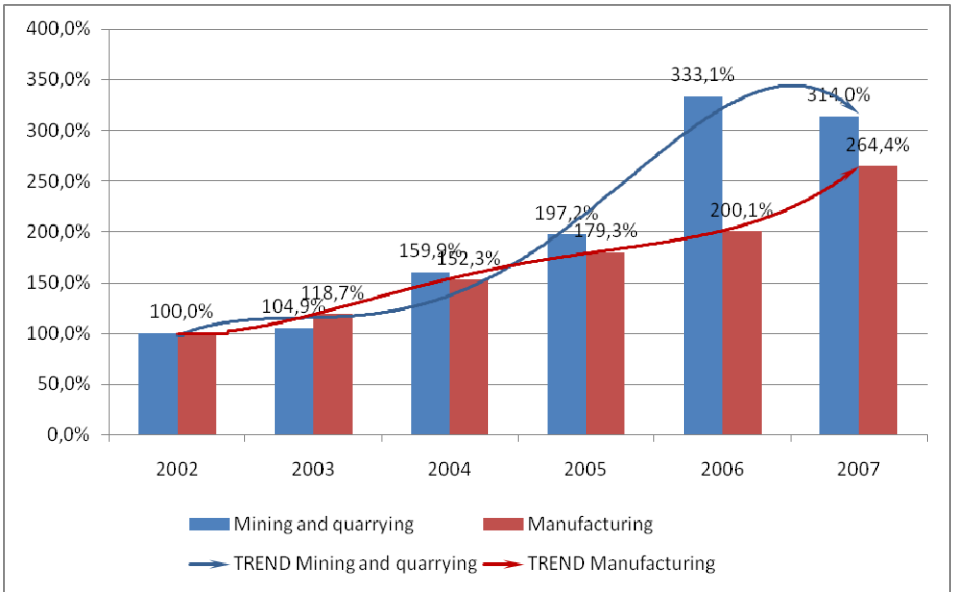


Source: *National Statistical Institute* and own calculations

The *Figure 1* shows only the quantitative change of industry. But industry growth is a long-term oriented concept and we need a confirmation of these results on a qualitative level. When we put attention on quality market variation (*Figure 2*) the interpretation of industry growth is changing dramatically. Although continuous grow of manufacturing sell we find not too fast quality changes of the sector. Vice-versa mining sector shows a sustainable sells but we find out a rapid increase of quality of these sells.

Figure 2

Quality market variation of industry growth (measured by added value)



Source: *National Statistical Institute* and own calculations

In conclusion, there are evidences for industry growth as a result of increase of market sells as better product quality. But does it be for a long term?

Which factors affect over the Bulgarian industry growth?

To analyze industry growth correctly we should find out how different factors vary over the last few years. Most commonly used factors are: rate of investments (*Figure 3*); rate of newcomers (*Figure 4*).

Investments' changes show that there a very fast increase of investments in pre-accession period. This result is a first proof for EU trust in Bulgarian industry. Enlargement of investments, especially in new technologies and products, are a guarantee for long term economic growth.

In comparison new comers' variation shows which market actors make these investments. The picture shows that there are not many new investors in Manufacturing, but there are a lot of new comers in mining. The last statement is an indicator that the manufacturing stables its structure whiles the process of re-structuring of Mining continue in pre-accession period.

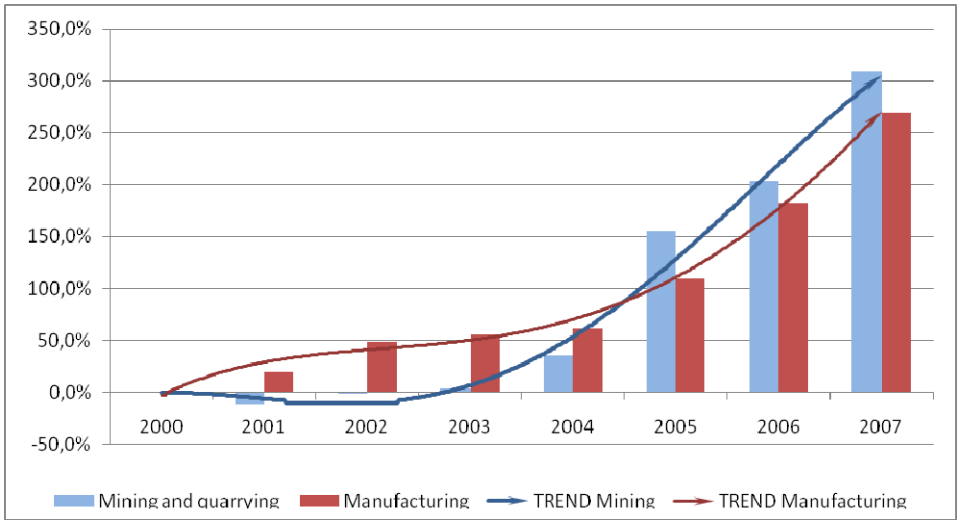
What is the affect of investments in Bulgarian industry growth?

The qualitative and quantitative indicators show a stable industry growth. But the question is: How stable is this growth?

We need to compare the conditional changes in observed indicators (*Figure 5* and *Figure 6*).

Figure 3

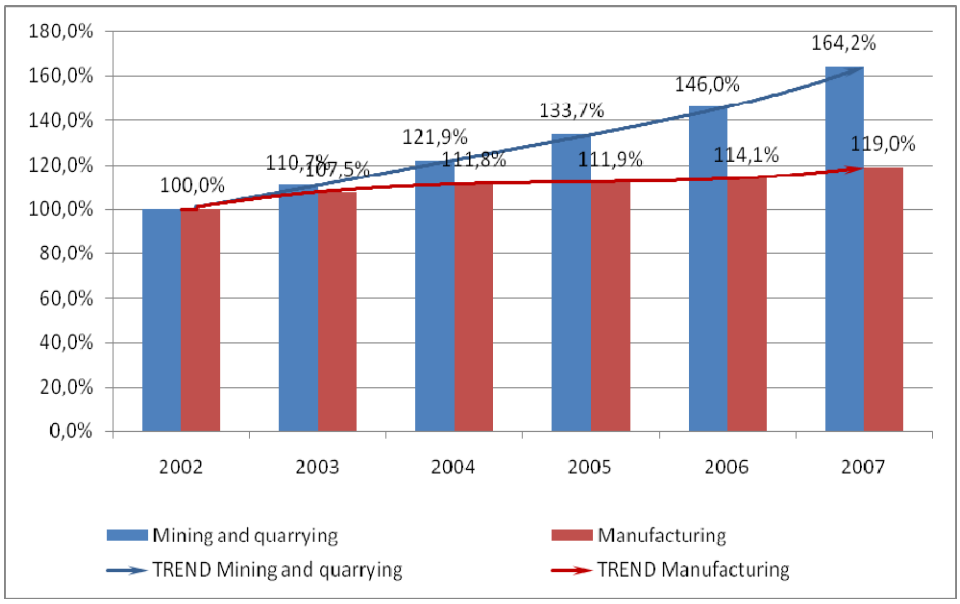
Investments' variation



Source: *National Statistical Institute* and own calculations

Figure 4

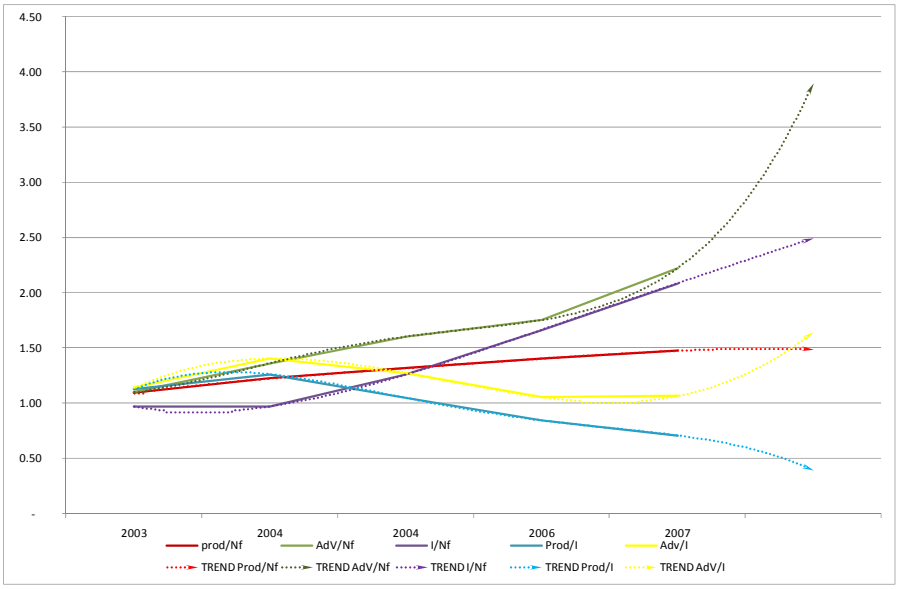
New comers' variation



Source: *National Statistical Institute* and own calculations

Figure 5

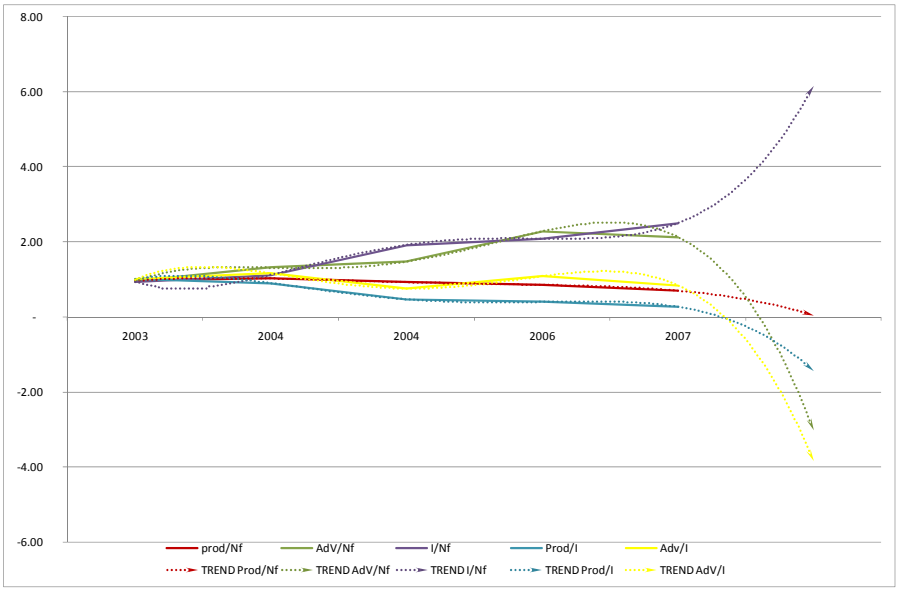
Dependency indexes in sector: Mining and quarrying



Source: *National Statistical Institute* and own calculations

Figure 6

Dependency indexes in sector: Manufacturing



Source: *National Statistical Institute* and own calculations

In conclusion, investments growth is a result of diversification and enlargement of activities in enterprises, which leads to increase of market potential of several industrial sectors. In general, investments in technology resulted in value added growth. In some industrial sub-sectors, decrease of value added is due to use of recycled technologies and equipment.

After the financial and economic crisis of 1996-1997, the Bulgarian economy marked eight consecutive years of economic growth. Fixed capital investment reached 20% of GDP in 2004 for the first time since transition started and continues to increase, credit activity booms and unemployment is steadily decreasing.

At present, Bulgaria competes with homogeneous, labor- and material-intensive products and the driving factor behind its competitiveness is low costs. Escaping this low technology trap requires the development of a flexible and open national innovation system within a competitive market economy framework that would ensure an influx and wide diffusion of foreign innovation in the country, and gradual development of local innovation capacity of European and global quality.

Investment in innovation is an instrument for industrial growth through improving the competitiveness of Bulgarian enterprises in the long-run. During the last few years, R&D expenditure in Bulgaria has been limited.

In the past ten years R&D expenditure as a percentage of Bulgaria's GDP (0.5% in 2006) has remained approximately six times lower than the average EU- 27 level. In addition, the contribution of enterprises in total R&D expenditure remains less than half that of the state, which is exactly the opposite situation as observed in the leading innovation economies in Europe. As a result the physical R&D capital in Bulgaria has been almost fully depreciated and the accumulated human capital has lost a substantial amount of its value (*Figure 7*).

Bulgaria is placed on the twenty-second place among EU27 by Gross Domestic Expenditure of R&D (GERD) which is highly unfavorable. Bulgaria spends less than 0.5% of GDP on R&D (*Figure 8*).

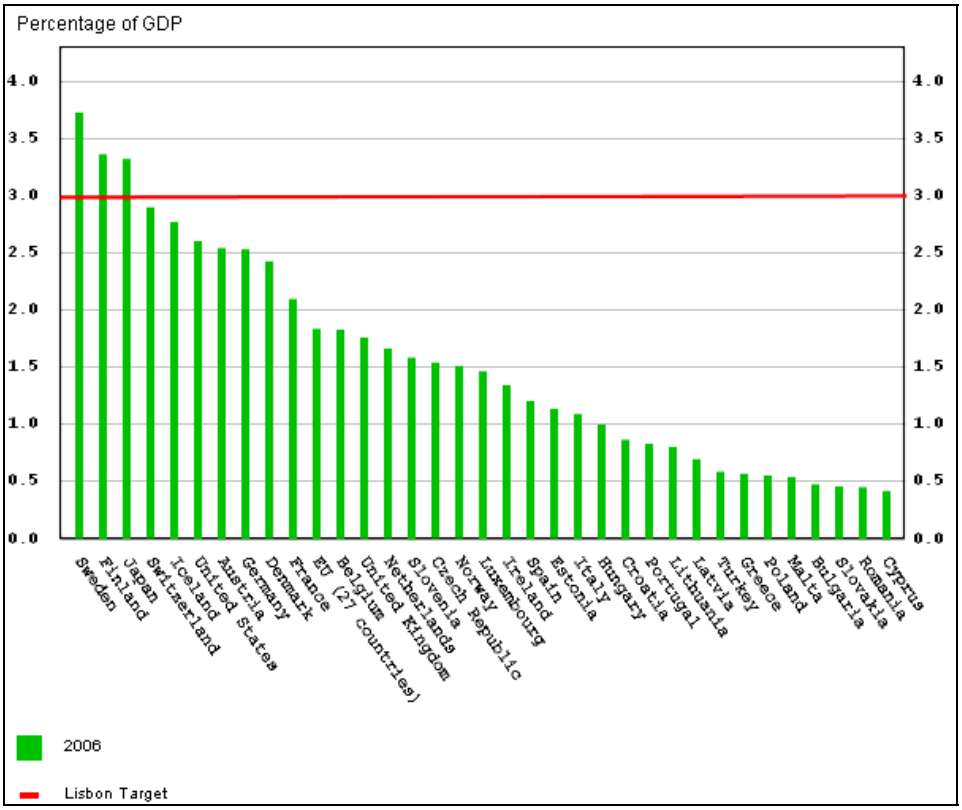
Prevailed part of expenditures for R&D are concentrated in the group of *Budget Organisations/Government Sector*. This group consists of research institutes, research centers and R&D laboratories, that are funded by the state budget. More than 50% of all expenditures are done by Budget Organisations. It is observed slight decrease of expenditures since 2000 in this group. In contrast – groups of *Enterprises and Non-commercial Organisations* increased the share of expenditures for R&D (*Figure 9*).

Analysis of expenditures in enterprises for R&D shows stable increasing trend. After EU accession it is observed increase by 5 per cent of total expenditures for R&D in enterprises than the pre accession period (*Figure 10*). In Bulgaria, the structure of expenditures by economic elements in 2008 remained unfavorable despite the small improvement over the past eight year period (*Figure 11*).

In the pre-accession period two groups of expenditures for R&D in enterprises show controversial tendencies. Since 2003 share of expenditures for labour and external services increase constantly, while the share of expenditures for tangible assets (technology, machines and equipment) decreased. Current expenditures amount to 80.79% of the total expenditures for R&D in 2008, while only 19.21% are allocated for the acquisition of tangible fixed assets (a 1% decrease compared to the previous year).

Figure 7

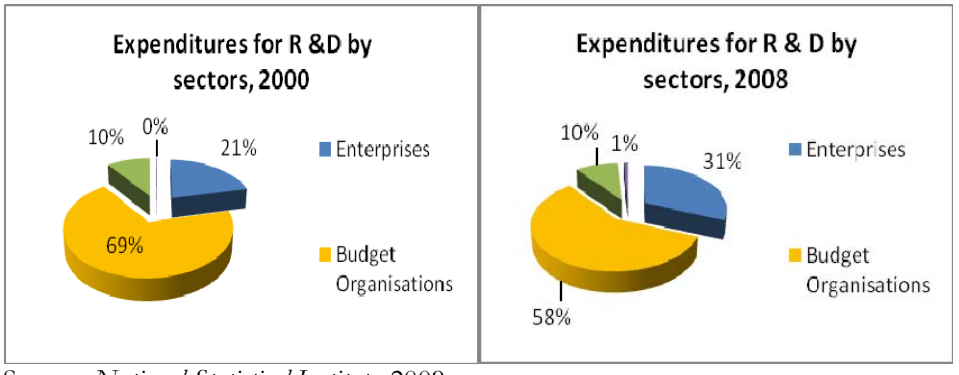
Gross Domestic Expenditure on R&D (GRED)



Source: *Eurostat*, 2009

Figure 8

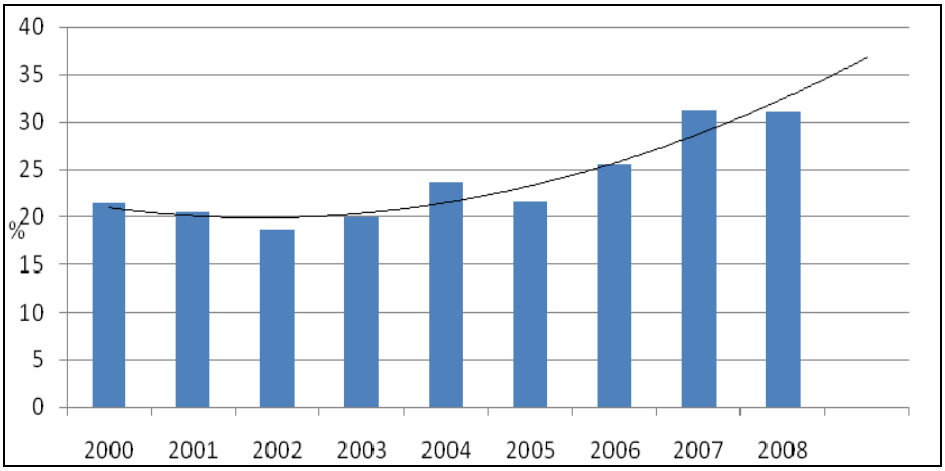
Expenditures for R&D by sectors, 2000 – 2008



Source: *National Statistical Institute*, 2009

Figure 8

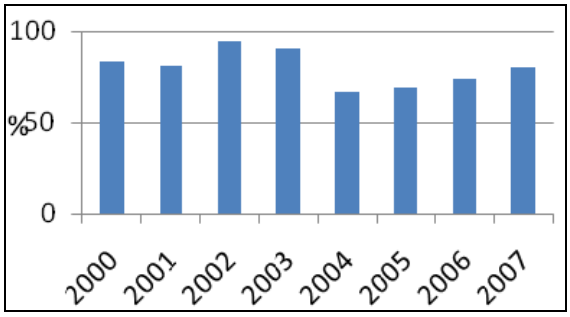
Expenditures for R&D in Enterprises as a percent from total expenditures for R&D (2000-2008)



Source: *National Statistical Institute*, 2009

Figure 9

Share of expenditures for labor and external services in enterprises



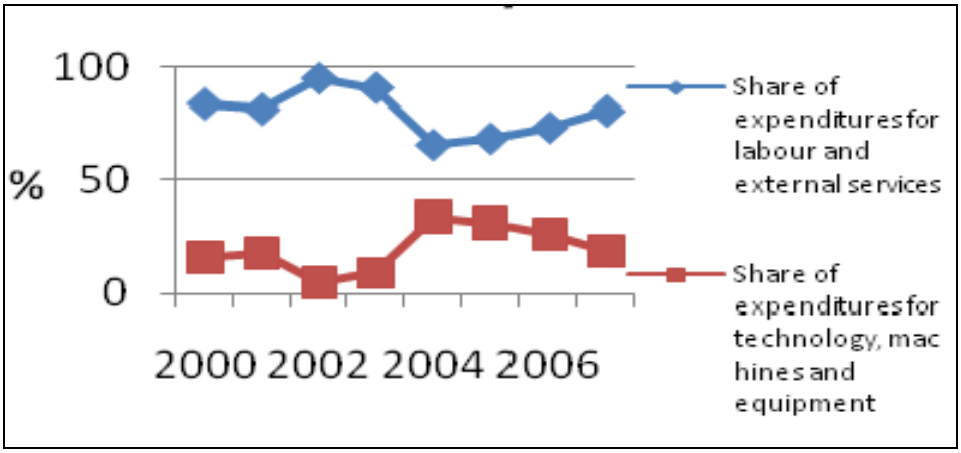
Source: *National Statistical Institute*, 2009

Despite the increased share of expenditures for R&D this tendency is negative. Investments in innovation are the funds spent on creating (or adapting) the innovation, technological and/or research product in the country. They are mainly used to cover the expenses for research and development activity (R&D). Investment in innovation depends on the functioning of the whole innovation system, yet they are most closely related to the presence of various funding mechanisms and tools, including venture capital (*Innovation BG*, 2009).

In a dynamic pattern Bulgarian enterprises focus mainly on the acquisition of machinery and equipment in their innovation activities. Innovative enterprises place R&D second and the training of employees comes third.

Figure 10

Elements of expenditures for R&D in enterprises

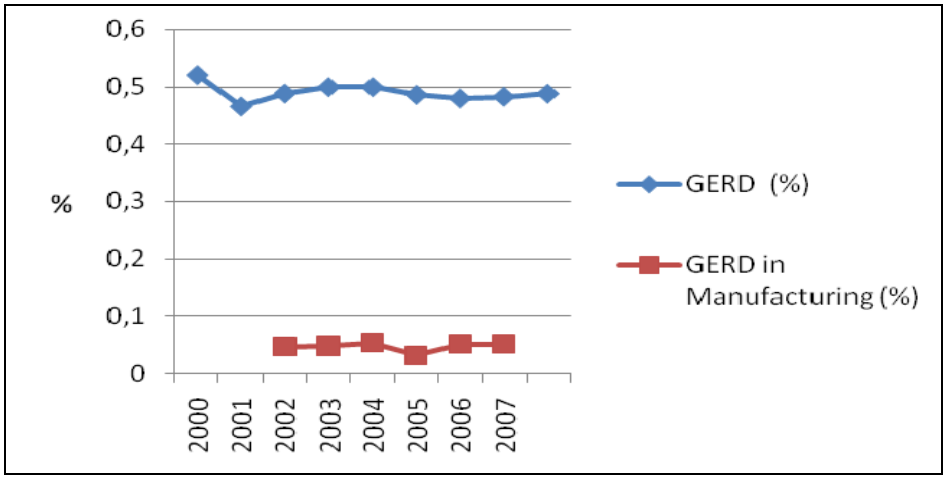


Source: *National Statistical Institute*, 2009

The sector with the largest share of innovation expenditures for the period of 2000-2007 is Manufacturing (more than 30%)(*Figure 12*).

Figure 11

Gross Domestic Expenditure on R&D (GERD), %



Source: *National Statistical Institute*, 2009

According to the latest available data of the National Statistics Institute the share of innovation enterprises in the country is 16.2% of the total number of working enterprises [4].

During the last years a general increase of the number of innovation enterprises can be noticed with the largest share being in the computer technologies, R&D, engineering and financial brokerage sectors (*Figure 3*).

The share of enterprises in the fields of computer technologies, architecture and engineering sciences represents only 6.46% of the total number of enterprises in the country (39.9% of the total number of innovation enterprises). The share of innovation enterprises in the transport, storage and communications sectors is low (7.2%) and the same applies to the electricity, gas and water supply sectors (9.9%).

The number of innovation enterprises in the country represents about one fourth of the same share in EU. According to 22.7% of the enterprises covered by a survey the reasons for the lack of innovation activities are different problems which impede their activities and 53.9% of them answer that those activities are not necessary under the existing market conditions [4]. This comes to show that a great number of the enterprises do not realize the character and significance of innovations for ensuring their competitiveness.

In almost all sectors of the economy product innovations prevail (44.8%). Process innovations are carried out only in 7.3% of innovation enterprises. They are predominant in enterprises from the mining industry and the production and distribution of electricity, gas and water supply. In EU the share of the process innovations, which ensure to a greater extent the increase of competitiveness of the enterprises, is larger. The technical level of innovations is still rather low. A great number of the product innovations have a limited scope and they can hardly influence the in-crease of the competitiveness of the companies. As a result of innovation activities a large number of enterprises have widened their product range and increased the number of new services and goods they offer (42.7%) and the quality of the existing products has also been increased (45.5%). The market share and has been enlarged and the entering on new markets has been favorably affected (32.8%), the production power of enterprises has also been increased (23.3%) and the prime cost of existing products and services has decreased (35.8%). These values apply to the pre-dominant number of innovation enterprises in almost all economic sectors with the exception of the production and distribution of electricity, gas and water supply where the main result for most of the innovation enterprises (61.6%) is the prime cost decrease and only 7.7% of the enterprises have put on the market new products and services. The relative share of innovation products represents a small part of the total volume of products. For 12.4% of the enterprises surveyed this share is up to 5%, for 24.5% – from 5 to 10%, for 24.8% from 11 to 20% and only for about 145 of the enterprises the share is over 50%.

It is necessary for Bulgaria to be very active in its efforts to attract investment and introduce innovation decisions so that its production to be competitive on the international markets. The data in the latest World Bank report about the global competitiveness for 2006–2007 years. Show that the rating of our country has deteriorated in the global context in respect to technological development (68th place) and innovation potential (87th place), and again insufficient and non-efficient interaction among the main sections of the national innovation system [6]. The major challenge in this respect is the most effective commitment of these institutions and

organizations and their integration into the European innovation infrastructure aimed at the gradual transfer of activities and responsibilities to the private sector [6].

The analysis of the enterprises in Bulgaria by types of innovation reveals a positive trend for the economy as a whole, increasing the share of mixed innovation (both products and processes) at the expense of purely product innovation.

Given the fact that most Bulgarian companies focus on well established and saturated markets (EU) rather than emerging industries, the implementation only of product innovation without accompanying process innovation means that enterprises rely mainly on the low cost of products and they will receive just a small portion of the added value of the end customer.

The analysis of innovative behavior of Bulgarian enterprises confirms that the Bulgarian economy is still at an early stage of its innovation development, where capital investment prevails over innovation.

Possible scenarios

Scenario 1. Pessimistic Scenario - Reducing investment and a declining rate of economic development.

The hypothesis is that due to the financial crisis the investments will be reduced drastically compared to the current level and the average of the last five years. One year after EU accession economic crisis additionally affects investment and innovation behavior of enterprises, and influences economic growth. Companies face a shrunk market, decreased sales revenue, difficulties in repayment of already made investments, necessity to reduce number of employees. All this leads to reduction or to cut off investment costs in the future (next 5-6 years), respectively in a midterm. Investment behavior varies among enterprise groups. Micro and small enterprises will cease any investments, while medium and large enterprises will undertake strategy of investment reduction.

Alternative of Scenario 1 is to increase the volume of investment expenditures but preserving level of their quality. This is also a pessimistic alternative with negative effect on economic growth. The outputs will be: low level of investment efficiency, loss of market positions, low revenues, low or negative value added. Enterprises will get into economic crisis in a midterm and Scenario 1 will be fulfilled. Under current state of the pace of development of investment in the short term is seen continuing sharp drop of investment's value added. Which in the medium term will lead to cuts in investments themselves and from here we move to the first scenario. The increase of investment's volume could be possible as a result of as utilization of Structural funds under OP "Development of Competitiveness of Bulgarian Economy" in short term.

Scenario 2. Realistic Scenario – Keeping investment volume and increasing the effect and quality of the investment output.

Under this scenario we assume that investment's volume will be maintained while investment's efficiency will increase and improve. In short term expectations are for change in the ratio investment: value added, i.e. creating more value added by making one BGN investment. This in midterm will lead to increased rate of return

and will attract more investments. Scenario 2 is a possible strategy and exit from the economic crisis. Subsectors with competitive advantages have an opportunity to benefit from such a scenario. In short term, medium and large companies from those subsectors will be able to implement and follow such investment behavior, while in the group of micro and small enterprises this scenario can be implement in midterm. Also, this scenario guarantees smooth and constant increase of investments and will have positive role and impact on investment behavior, respectively on industrial growth and industrial dynamics.

Scenario 3. Optimistic Scenario – Increasing volume of investments and efficiency and quality of investment output.

Implementation of such a scenario will lead to accelerated economic growth and steadily increasing competitiveness. This scenario is difficult for implementation during the period of economic crisis due to outflow of foreign direct investments and investment risk. In long term this is a possible investment strategy.

CONCLUSIONS

Until recently, Bulgaria's economic growth has been driven by two factors: 1) the increase in the effectiveness of use of the existing capital and labor resources, resulting from the financial stabilization, privatization, liberalization and institutional reforms, and 2) the gradual recovery of the physical capital lost during the transition period through a pick-up in domestic and foreign investment. Enterprises' main competitive advantage thus far has been its low labor costs. But this advantage will quickly be eroded in the face of growing international low cost competition. Hence, the enterprises redirect their long-term growth strategy towards investment in technological upgrading, innovation and improvement of the quality of human capital. This new strategy is centered around the development of a dynamic, market oriented and internationally open national innovation system, which stimulates entrepreneurship and investment in the acquisition and creation of new technologies and skills.

Investments growth is a result of diversification and enlargement of activities in enterprises, which leads to increase of market potential of several industrial sectors. In general, investments in technology resulted in value added growth. In some industrial sub-sectors, decrease of value added is due to use of recycled technologies and equipment.

The most appropriate approach of subsectors and enterprises with potential for development is to keep investment volume and to increase the effect and quality of the investment output.

REFERENCES

Annual Report on the Bulgarian National Innovation Policy (2006): MEE, S., 335. p.

Bresnahan, T., Malerba, F. (1997): Industrial dynamics and the evolution of firms and nations competitive capabilities in the world computer industry, paper.

Carlsson, B., Eliasson, G. (2001): Industrial dynamics and endogenous growth. Paper prepared for the Nelson and Winter Conference of the Danish Research Unit for Industrial Dynamics (DRUID), June, [online] <URL: http://www.druid.dk/conferences/nw/>

Dietrich, M. (2006): The Economics of the Firm. Routledge, London

Dosi G., Malerba, F. (2002): Special Issue on Industrial Dynamics. Industrial and Corporate Change, 11. 619-622. p.

Eliasson, G. (1996): Firm Objectives, Controls and Organization – the use of information and the transfer of knowledge within the firm. Boston/Dordrecht/London : Kluwer Academic Publishers

Eliasson, G. (1998): Competence Blocs and Industrial Policy in the Knowledge Based Economy. OECD Science, Technology, Industrial (STI) Revue

Eliasson, G. (2000): Industrial Policy, Competence Blocs and the Role of Science in the Economic Development. KTH, TRITA.IEO R 1998-08., Journal of Evolutionary Economics, No. 1, 2000

Eliasson, G. (2001): The Role of Knowledge in Economic Growth. KTH-TRITA, Stockholm. To be published in Helliwell, John (ed.), 2001

Eliasson, Gunnar, Erol Taymaz, (2000): Institutions, Entrepreneurship, Economic Flexibility and Growth – experiments on an evolutionary model. KTH, INDEK, TRITA-IEO-R 1999:13; Cantner-Hanush-Klepper, 1999, Economic Evolution, Learning and Complexity – Econometric, Experimental and Simulation Approaches

Eurostat (2009): Gross Domestic Expenditure of R&D (GERD), [online] <URL: http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/introduction>

Forrester J. W. (1988): Designing Social and Managerial Systems, System Dynamics Group, Sloan School. Cambridge, MA. Massachusetts Institute of Technology, October 1988

Forrester, J.W., (1961): Industrial Dynamics. Portland, Oregon: Productivity Press.

Innovation BG 2009. ARC, Sofia.

Jiandong Ju, Justin Yifu Liny, Yong Wang, Endowment Structure, Industrial Dynamics, and Economic Growth, [online] <URL: http://ihome.ust.hk/.../Endowment Structure, Industrial Dynamics and Economic Growth.pdf>

Kopeva, D., Shterev, N., Blagoev, D., Gradev, T. (2009): "Industrial dynamics under conditions of European integration", Project:SRA21.03-7/1009, University of National and World Economy (UNWE), Business Faculty.

Krafft (2006): Introduction: what do we know about industrial dynamics?, Revue OFCE, June 2006, [online] <URL: http://www.ofce.sciences-po.fr/pdf/revue/hs-06-06/rhs-06-06-intro2.pdf>

National Strategy for Encouragement of the SMEs Development 2007–2013, MEE, S. (2007) 76 p.

Understanding Economic Growth (2004) OECD.

Winter, S., Kaniovski, Y., Dosi, G. (1998): Modeling Industrial Dynamics with Innovative Entrants, International Institute for Applied Systems Analysis, IR-98-022 /May 1998.

Year Book. NSI (various years) – 2000 – 2009; [online] <URL: http://www.nsi.bg>