

Small and Medium Enterprises and Their Role in Regional Development (Case Bratislava)

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Introduction

In this paper we describe how decentralized innovation policy helps to develop innovation through its own instruments, contacts between small and medium enterprises (SMEs) and universities and research institutes. It is based on the preliminary results of research in the Bratislava region.

It is very important for a proper understanding of regional development in the Slovak Republic to investigate the real influence of regional and innovation policy on the industrial sector and in particular on SMEs. The question is, are these small and medium enterprises really innovative? The position of SMEs differs from that of large enterprises, and there is some support from studies that large enterprises are more innovative. We base our ideas on Lundvall's (1992) understanding that an innovation system is comprised of elements and relationships, which interact in the production, diffusion and the use of economically useful knowledge. It is considered a social system in the sense that innovation is the result of social interaction between economic factors. It is an open system interacting with its environment.

The paper concentrates on the problem of how decentralized economic and innovation policy helps to develop innovation institutions and human potential. It presents the results of the survey that was carried out by the *Economic University's Department of Regional Development and Geography* in Bratislava. The survey also intends to investigate the links between SMEs (electro-technical, chemical and machinery industries) and research institutes.

The project carried by the Economic University in Bratislava *Small and Medium Enterprises in the Bratislava Region* concentrates on how innovation really can be promoted. In this way it is our wish that regional policy should be based on real recommendations resulting from our investigations. These investigations try to establish interesting causal links between innovation and the regional aspects of the economic activity of SMEs, taking into consideration also the unique position of Bratislava, which has many SMEs and research institutes.

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In order to interpret innovation policy it is necessary to describe the changes in economic policy. In the following section the new economic conditions in the Slovak Republic and the industrial structure will be defined. The rest of the paper concentrates on Bratislava region in particular.

1. The Changing Economic Policy and Industrial Structure in the Slovak Republic

Since 1989, the Central and Eastern European countries have undergone profound economic changes. Systems of central planning characterizing the Central and Eastern European economies have been dismantled, industry privatized, trade liberalized and economies generally stabilized. Slovakia is one of the countries, characteristic with rapid transition of its industry and increasing innovative activities in its core region, Bratislava.

The population of the Slovak Republic is approximately 5.3 million, with about 2.5 million employed and just less than 0.34 million unemployed. The average nominal monthly wage of an employee is 320 EUR – being slightly higher in manufacturing (332 EUR) and lower in education and research (250 EUR). Gross domestic product (GDP) is approximately 20.8 billion EUR. The inflation rate is 6.5 per cent per annum (year 2000 – Statistical Office of the Slovak Republic).

Economic life under the communist regime involved the concentration of industry in highly specialized industrial districts with priority given to heavy industry. Economic activity was centrally planned and vertically structured. A common feature was the absence of horizontal linkages between different economic activities.

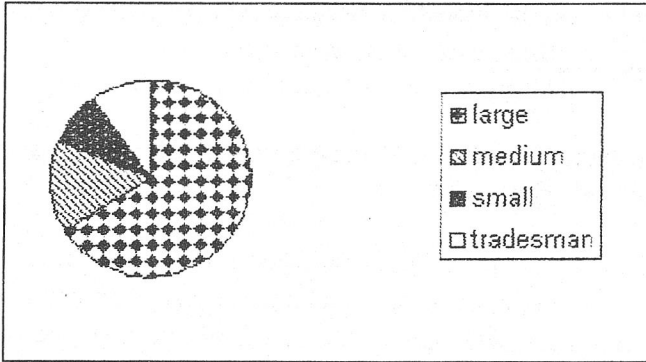
Industry has an important (33 per cent) share of the total volume of Slovak production. In industrial organizations, there are 76 000 employees with an average monthly nominal wage of 332 EUR). Industry in the Slovak Republic is mainly dominated by the chemical, machinery and food industries. Industrial enterprises fulfilled their production plans with some negative influences on employment.

The presence of foreign capital (from 17 per cent to 100 per cent in most important enterprises) stabilized production programmes, and the growth of the competitiveness of entrepreneurial activities form preconditions for development opportunities and the establishment of the Bratislava region in the economy of Slovak Republic.

Figure 1 gives the share of different size of enterprises in industrial production in 2001.

Figure 1

The Share of Different Size of Enterprises in Industrial Production (2001)



The SME sector started from scratch after 1989. Before this period, practically no small and medium size enterprises existed but after the so-called *Velvet Revolution*, many small and medium size enterprises were set up in the wake of the social and economic changes that occurred either as new start-ups or spin-offs from large enterprises. Nevertheless, large enterprises remain the most important economically, creating the foundation for the economic well being of the country. It is a fact that despite the new start-ups and spin-offs, large corporations create the economic potential of the country.

A total of 201 legislative amendments were adopted last year concerning directly and indirectly the business environment. Not all of them have positive impact or introduced expected improvements in certain areas. Ministry of Economy of the Slovak Republic is the carrier and coordinator of activities that concern SME. During the past year, activities in this area followed Act of the National Council of the Slovak Republic No. 231/1999 on State Assistance. In this connection, Ministry of Economy of the Slovak Republic was running 17 programs of state assistance for SME. This ministry directs the activities of the *National Agency for Development of SME* and the development of *Regional Advisory and Information Centres (RAIC)* and *Business Information Centres (BIC)*. Ministry of Economy of the Slovak Republic is also one of the founders of the *Slovak Investment and Trade Development Agency* whose major business is to support investments and exports. Pursuant to the competencies laid down in Act No. 575/2001 as amended from time to time, the Ministry of Finances of the Slovak Republic is the drafter, and via the tax offices, also the executive body of tax related regulations. There exist different loan programme schemes. For instance *Slovak guarantee and Development Bank* implements *Direct Loan Programme for Small Enterprise*. The *Loan Program Support* allows entrepreneurs

to take up credits up to 170 732 Eur with a maximum tenure of 7 years at the fixed interest rate of 10.5 per cent. The Loan Programme Development has maximum amount of loans 1 365 853 with current interest rate 13.5 per cent. *National Agency for Development of Small and Medium Enterprises* (NADSME) in cooperation with PHARE has also financed support.

As of December 31, 2001, 99 072 legal entities were registered in Statistical Office of the Slovak Republic including 62 867 companies and 30 205 non-profit organisations. The bulk of overall numbers of for profit organisations were small enterprises (94.6 per cent there of microenterprises with 0 – 9 employees accounting for 80.9 per cent), medium and large enterprises accounted for 4.5 per cent and 0.9 per cent. The numbers of small enterprises increased by 2 205, those of medium and large enterprises dropped by 238 and 20 respectively. There were 59 452 small private enterprises with up to 49 employees, 2 825 medium private enterprises with 50 – 249 employees. Most of SMEs were doing business in the sector of trade (26 673), trade services and monetary sector (12 112), manufacturing of goods (7 691) and building industries (4 777). Concentrating on the ongoing trend, we witness an increasing tendency for the foundation of small enterprises and a decreasing tendency for the foundation of medium sized enterprises.

However, while there are problems country-wide, Bratislava itself is in a relatively favoured position, as reflected by the fact that many new enterprises founded after 1989, are still in existence. Bratislava has very good location, because it lies on the borders of Austria and Hungary, with relatively good business contacts and logistics with both countries. These factors help to develop entrepreneurial attitudes and encourage SME formation.

What are the innovative abilities of enterprises in Slovakia? The results of a survey conducted by the Statistical Office of the Slovak Republic are given in the report *Innovation Activities in Manufacturing in the Slovak Republic* (2001). In this, 167 enterprises from the Bratislava region (148 small and medium size enterprises) were investigated. The report estimates that about 17 per cent of all manufacturing enterprises in the Slovak Republic are technological innovators (the data for EU-15 is 51 per cent), i. e. They have introduced technologically new or improved products or processes during the surveyed period (1987 – 1999). Innovative activity was the highest in large enterprises with more than 250 employees, of which 43 per cent were innovating, while only 17 per cent of medium size enterprises with 50 – 249 employees and 7.3 per cent of small enterprises with 20 – 49 employees were innovating. It means our sample does not show a high presence of innovation activities among small and medium size enterprises.

It was found that 31 per cent of the innovating enterprises have introduced a product innovation and 18 per cent introduced process innovation. The remaining

innovators (51 per cent) have introduced both, i. e. product and process innovation. Approximately half of the innovating enterprises have carried out R & D on a systematic or occasional basis. The highest share of innovators with R & D activities was found among the large enterprises (61.9 per cent), followed by the small enterprises (54.3 per cent) and the medium size enterprises (45.3 per cent). Approximately one third of the innovators cooperate with other partners in developing innovation. Most of them (74.5 per cent) claimed to cooperate with private research institutes; out of them 56.3 per cent cooperated with universities and 40.2 per cent cooperated with research centres.

All the figures related to innovativeness indicate the increasing concern of firms for innovative activities. As one expects most of these innovative firms are concentrated in certain nodes, especially in Bratislava. That is why this region is one of the best places for the analysis of innovative relations between SMEs and the institutions in the wider Europe.

2. The Importance of Bratislava in the Slovak Republic

The importance of the Bratislava region is stressed by interregional dimension. European economy influences also this dimension (specially the strongest economic regions in EU, which are in reach). This European context is influenced also by position and function of metropolitan region Vienna – Bratislava within network of European developmental poles (metropolitan regions), by position of European traffic corridor, by markets of economically most developed EU regions, by markets of transitive Central European and Southern European countries with strongly differentiated economic development and with conditions of using internal developmental phenomena, specially human capital, by proximity of sources of capital and new technologies – not mentioning only foreign capital, but also by local and regional sources of capital (Tvrdoň et al., 1999, p. 9).

Besides these international connections, the importance of this region for SME comes out from diversified economic regional structure, quality of human potential in connection with educational and research potential in the region, access to hardware and software infrastructure (Buček and Tvrdoň, 2000).

The evaluation of the level of regional development that meets the requirements and criteria of the European Union shows that the Bratislava region has a significantly higher GDP per capita (PPP – Purchasing Power Parity in nominal value) than the other regions. Table 1 shows the regional variation together with the GDP per capita for the country as a whole, which is only 48 per cent of the EU average. More significant spatial variations differences are apparent at the county level (NUTS III).

Table 1

Gross Domestic Product in Purchasing Power Standard (PPS) per capita (in per cent) of EU-15 Average

Region	1996	1997	1998	1999
Bratislava	92	100	99	95
Tnava	51	50	50	52
Trenčín	44	44	44	44
Nitra	37	39	40	40
Žilina	38	40	40	40
Banská Bystrica	42	43	43	43
Prešov	30	31	31	31
Košice	44	44	47	47
Slovakia	46	48	48	48

Source: Statistical Yearbook of Region of the Slovak Republic 1996 – 2000 [21].

The Bratislava region has a special position, not only in comparison with other Slovak regions, but also in comparison with the EU average. With the level equal to 95 per cent of the EU average and 269 per cent above the average of Central European countries, it can be classified as one of the most developed regions within Central Europe. The other regions in Slovakia range from 31 per cent to 52 per cent of the EU average.

The Bratislava region covers an area of 2.053 kilometres. At the end of 2001, the population amounted to 617 000, which represents 11.4 per cent of the inhabitants of Slovak Republic. The number of economically active people was 334 300 in 2001. This number represents 90.8 per cent of people of working age and 8.9 per cent unemployed. Following table shows the employment by sectors in Bratislava region.

Table 2

Employment by Sectors in Bratislava Region (2000)

	Number	Per cent
Agriculture, forestry	3 831	1.7
Mining	593	0.3
Industry	38 455	17.4
Production and distribution of electricity, water, gas	6 104	2.8
Building industry	11 417	5.2
Commerce	16 469	7.5
Restaurants, hotels, accommodation	3 435	1.6
Transportation, storage facilities, telecommunications	25 442	11.5
Monetary and insurance	15 079	6.8
Services for enterprises, research, and development	20 588	9.3
Public administration, defence	18 644	8.5
Education	26 705	12.1
Health and social services	19 040	8.6
Other public and personal services	14 789	6.7

Source: Statistical Yearbook 2001 [22]; calculated by Tvrdoň and Babiar.

Generally speaking, the city of Bratislava holds the dominant position in the economy of its region, and its economic structure determines the economic profile and level of the entire region. Bratislava also has a very good position in the industrial sector as was mentioned earlier.

2.1. Innovation Infrastructure of Bratislava

In a way to understand more clearly institutional support of education, research and development in Bratislava, we need to understand it in general. There are two ministries supporting Research and Development (R & D) – Ministry of Education of the Slovak Republic and Ministry of Economy of the Slovak Republic. Competition between the Ministry of Economy of the Slovak Republic and the Ministry of Education of the Slovak Republic has resulted in two tier system of policy development: one for universities and academic institutions and another for applied sciences. The government has developed a range of guidelines and policy goals for the transformation and development of industrial research and technology policy such as Principles of State Science and Technology Policy or the Principles of Technology Policy of Industry.

The general downsizing in the field of education and research was accompanied by the introduction of stringent accreditation and assessment systems at both the institutional and personal level. Still in 2001 there are nearly 15 000 employees employed in research of which 62 per cent are researchers. Dramatic changes as reduction of personnel have compelled research institutes towards applied research and demand side orientation. There is little co-operation between research institutes and the universities or industry and the organisational structure is very poor.

The Bratislava region, due to the city Bratislava, has the highest share of university-educated people of Slovakia – 55 per cent of inhabitants have secondary education and 22 per cent are university educated.

Within the territory of Bratislava there are five universities with 24 faculties. The student population consists of 36 062 full time students (40 per cent) and 7 500 part time students. The Slovak Technical University is the largest educational establishment in the field of technology and has many faculties. In six faculties, more than 1 600 teachers pursue a wide range of teaching, research and professional interests. The increasing development of technology has been reflected by an increase in the size and diversity of research involvement and teaching at universities.

The dominant position of Bratislava in the field of higher education is clearly demonstrated in following figures; 51 per cent of all professors and 52.3 per cent of students live in Bratislava.

Regional differences in the share of the labour force with completed university education in the economically active population are not so dramatically different, but still exist. The Bratislava region with a share of 11 per cent of the population has a 22.6 per cent share of the labour force with completed university education (Table 3).

Table 3

Regional Differences in Human Potential

Region	Share of employees with university education in the economically active population (in per cent)		
	1997	1998	2002
Bratislava Region	24.6	25.0	22.6
Slovak Republic	10.8	10.7	11.9

Source: Authors calculations based on The Statistical Office of the Slovak Republic 2002 [22].

2.2. Bratislava as the Centre of Research

The Bratislava region has been the centre of scientific research for a long time in Slovakia. Almost all of the government research centres and a large number of research centres in the higher education sector are situated here (Table 4).

Table 4

Number of R & D Organizations by Sector

	Total number of organizations	Of which		
		business enterprise sector	government sector	higher education sector
Bratislava region	135	44	67	24
SR average	39	21	11	8
SR total	315	168	85	62

Source: Selected indicators of R & D Organizations in the Slovak Republic 2000 [19].

In total there are 47 institutes of the Slovak Academy of Sciences located in the Bratislava region providing basic and applied research in the field of physical, life and social sciences. The Slovak Academy of Sciences has undergone major changes in the past ten years, with many research institutes decreasing their employees.

Although the scientific potential in the Academy is large and the institutes are leading research institutes in the Slovak Republic, cooperation with SMEs still remains very weak. In reality, a small number of contacts, specialized for the business sector, resulted in the lack of demand from the private sector. Frequently mentioned shortcomings are associated with totally inadequate support from public administration both in the field of legislation and financing.

2.3. Financing Research and Development in the Bratislava Region

As opposed to the global trend of increasing expenditures on research and development, in Slovakia we observe decreasing expenditure relative to GDP, from 1.03 per cent GERD/GDP in 1996 to 0.69 per cent in 2000. This situation is similar in both the business and public sectors. The decline of expenditures on R & D is mainly caused by a 44 per cent fall in business sector spending between 1997 – 1999. With the exception of general research activities, most expenditure is dedicated to the manufacture of chemical products, rubber, plastic products, machinery and basic metals.

The uneven distribution of expenditures on R & D is a serious problem; most of the R & D capabilities are located in the capital city, Bratislava. Even though the share of expenditures on R & D is relatively high in the Bratislava region (1.22 per cent) compared to the Slovak average, it is still far below the EU average of 2 per cent. When we look at R & D expenditure in the Bratislava region we also see a downward trend in the public sector.

Table 5

Trends in Gross Expenditures on R & D relative to GDP

	1996	1997	1998	1999	2000
Bratislava region	1.54	1.54	1.47	1.32	1.22
Slovakia	1.03	1.13	0.82	0.68	0.69

Source: Authors calculations based on Yearbook of Research and Development 2000 [24].

2.4. Financial Support for Research Institutes

Research institutes in Bratislava region are supported mostly from state funds; only 49.8 per cent of R & D expenditure comes from the business sector (the average is 60 per cent in the developed countries). Most R & D spending is focused on institutions such as the Slovak Academy of Sciences. A serious problem is caused by a very low share of capital expenditure in relation to current expenditure what means that investment in the future, new equipment, etc. is strongly neglected (only 17 per cent of the total GERD). It seems that a survival mentality is dominant. Commercial R & D in Bratislava tends to be carried out by large international firms, which operate independently. Government subsidies and employment programs have been established to encourage internal financial investment. Industrial R & D tends to be supply oriented and products are oriented towards low technology markets. It is clear that the financial situation in the different research institutes has a bad effect on technological and knowledge transfer.

A very low level of knowledge transfer can be seen to be a consequence of the limited growth of facilities such as scientific parks, technological areas or scientific centres, which are only at the early stage of their development, and the process of learning systematically how to manage these activities is ongoing.

2.5. Institutions Promoting Innovation

The Business Innovation Centre in Bratislava is one of the institutions promoting innovation carrying out numerous business consultations and assisting in the development of many business plans. Also a total of about 30 innovative companies have already been established in incubation centres most of these projects being related to information technology, logistics, environmental technology, heating systems and special services for industry.

In July 2000, FEMIRC Bratislava became a full member of the EU Innovation Relay Centre Network. The main mission of the Innovation Relay Centre IRC Slovakia is to support the development of innovation processes, especially for SMEs involved in national and transnational technology transfer, and the dissemination of information concerning the EU R & D programs.

The participation of Slovak R & D programs in EU programs is also a very important Technology transfer activity forms the substantial part of IRC work. The technology sectors, which IRC concentrates on, are tool processing for the automotive industry, wood processing, information technology, biotechnology, environment and non-nuclear energy and the agro food sector.

Awareness of the importance of public support for technology transfer and knowledge diffusion has increased and the need for effective exploitation of the results of scientific research and of human potential has been officially recognized as one of the top priorities for the Bratislava region's economic development. Also business research cooperation has been considered to be the necessary precondition for the process of the restructuring of the regional economy. In July 2001, the Slovak government approved a manual on industrial parks. This act helped individual projects to receive financial support for covering 70 per cent of all costs.

3. The Case Study: The Preconditions for Development of Small and Medium Enterprises in the Bratislava Region

The main goal of the case study is the analysis of institutional, innovative and regional preconditions for the real development of SMEs in the Bratislava region. We have focused our attention on SMEs in the sectors mostly represented in the Bratislava electro-technical, machine and petrochemical industries. Our

case study also concentrates more on the local and regional aspects stimulating or diminishing innovation potential in the SME sector in the Bratislava region. Our primary interest has not been to find out what kind of innovation resulted from cooperation, but how the innovation potential was used in the region, and this has motivated the construction of our questionnaire, which has been designed to uncover the factors influencing technology and knowledge transfer in the region.

Our investigation also differs from the investigation conducted by the Statistical Office of SR, because it not only concentrates on partial findings concerning innovation from the perspective of SMEs, and how this knowledge and technology transfer is possible, but also from the perspective of research institutes.

The Bratislava region has many SMEs, research institutes and universities and as such, it has the excellent potential for possible contacts among firms and research institutes and for possible technology and knowledge transfers. Our interest is based on investigating the situation in three industrial sectors mentioned above: namely the chemical, electro-technical and machine industry, and on contacts with higher educational and research institutes.

We have concentrated on case studies involving 35 SMEs from the three industrial sectors and also involving 20 research institutes, looking at their potential for cooperation and collaboration. These firms and research institutes are examined for evidence of real positive or negative inputs of governmental and regional policy and their impact on SME innovative activities.

These investigations are based on two types of questionnaires – one is inspired by a questionnaire created in Austria (*Vienna University of Economics and Business Administration*) and has the following parts: a) institutional – where different institutions, governmental and private firms are investigated as potential partners assisting in new product development; b) regional conditions for the development of innovative activities of firms, and c) priorities concerning governmental policy. The other questionnaire investigated cooperation between research institutes and universities with different SMEs in order to discover the channels along which technological and knowledge transfers flow.

The project intends to show ways of promoting the innovation potential in different SMEs and provide recommendations regarding changes that could be made to government policy in order to improve the situation.

3.1. The Findings of the Stage I: Innovation and Business Environment of Small and Medium Enterprises

During first period of the investigation, we concentrated our interest on the innovation and business environment of small and medium enterprises in Bratislava.

a) *The nature of technology and knowledge transfer*

One of our findings was that the most frequent contacts were between different departments of the Slovak Technical University (13) and different research centres (9) and SMEs. Very occasionally there were also contacts between the institutes of the Slovak Academy of Sciences and SMEs, the House of Technology and the Slovak Chamber of Commerce, which offered occasional information and help for the SME sector as well.

What was important was the discovery that there are very few contacts between industrial SMEs and research institutes; but there is much more contact between the firms themselves (Table 6).

Table 6

Frequency of Interactions with the Following Institutions in the Innovation Process

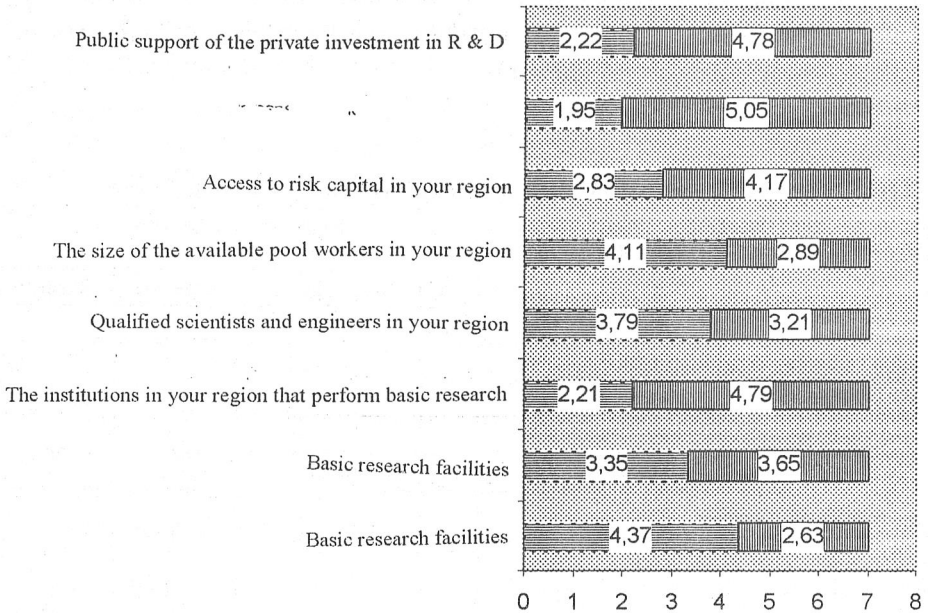
<i>Institutions in the Bratislava region that assist in the new product development process</i>	Frequency of interactions (Number of firms)			
	Unknown	Never	Sometimes	Frequently
<i>Universities</i>				
University of Economics in Bratislava	0	28	1	0
Slovak Technical University	0	17	12	0
Comenius University	0	29	0	0
City University Bratislava	1	29	0	0
<i>Private or Public Research Organizations</i>				
Slovak Academy of Sciences	0	25	5	0
Other research centres	0	19	9	1
BIC Bratislava	3	25	1	0
National Agency for the Development of SMEs	1	25	3	0
European Information Centre	0	30	0	0
House of Technology (ZSVTS)	1	24	5	0
Innovation Relay Centre Slovakia	5	22	2	0
TIPS – Technology and Business Information	7	21	0	1
SARC – Centre for the Advancement, of Science and Technology	5	23	0	1
<i>Venture Capital Firms</i>				
Seed Capital Company	3	26	0	0
Innovate Fund	2	27	0	0
Slovak Guarantee and Development Bank	0	25	4	0
Slovak-American Business Fund	5	25	0	0
Slovak Chamber of Commerce and Industry	0	15	9	3
Slovak Chamber of Entrepreneurs	0	27	1	1
Slovak Association of Entrepreneurs	1	26	1	1
Slovak Association of Cooperative Societies	2	25	2	0
<i>Regional Customers</i>		5	12	10
Other firms	4		18	7
Regional suppliers	10		6	11

b) *Appraisal of factors relevant for innovation potential*

The appraisal of factors relevant for innovation development concentrated on different kinds of questions designed to reveal the approval that exists for

research within the SME sector. In general, it can be said that there is appreciation of R & D in the SME sector. The importance of skilled workers in the region and the presence of basic research institutes and universities were generally acknowledged (Figure 2).

Figure 2
Appraisal of Factors Relevant for Innovation Potential



It appears that one of the basic preconditions for regional economic development is fulfilled. The other conditions are not highly developed. For instance it is very difficult to access risk capital. Even more important is the finding that there are not sufficient measures to promote innovation, which results in inefficient technology and knowledge transfers.

One of the most important reasons for the lack of efficient measures are local and regional taxes. These taxes are very high and hold back business expenditures on research and development and limit access to venture capital (see Table 7).

Table 7 also shows responses to some of our survey questions that provide further insight into the conditions underpinning future innovative development in the region, as they are perceived by the SMEs, and highlights the lack of fiscal incentives for R & D in the region.

Table 7

Conditions Underpinning Innovative Development of Firms (Questionnaire)

Questions	Possibilities	Scores (1 – 7)	Answers
<i>Basic research facilities are</i>	Many	4.37	Few
<i>Basic research facilities are</i>	Ineffective	3.35	Effective
<i>The institutions in your region that perform basic research</i>	Rarely transfer knowledge to your industry	2.21	Frequently transfer knowledge to your industry
<i>Qualified scientists and engineers in your region are</i>	Scarce supply	3.79	Sufficient supply
<i>The size of the available pool of skilled workers in your region</i>	Is too small or inflexible, which hinders your growth	4.11	Is sufficiently large and flexible to permit growth
<i>Access to risk capital in your region is</i>	Difficult	2.83	Easy
<i>Business expenditures on research and development</i>	Not encouraged by provincial and regional taxes and incentives	1.95	Encouraged by provincial and regional taxes and incentives
<i>Public support of the private investments in research and technology is</i>	Insufficient	2.22	Sufficient

c) Priorities for government policy

The other very important questions that were asked were related to the priorities given to different aspects of government policy, one of the crucial findings being that business is negatively influenced by insufficient logistics and transport. The other finding is the importance attributed to a lack of information and communication infrastructure.

Regarding the nature of the environment, we may say that it is pro innovative. The sufficiently large and flexible pool of skilled workers is a likely indicator that the adoption rate, meaning the rate of adoption of new technologies and work techniques, is very high.

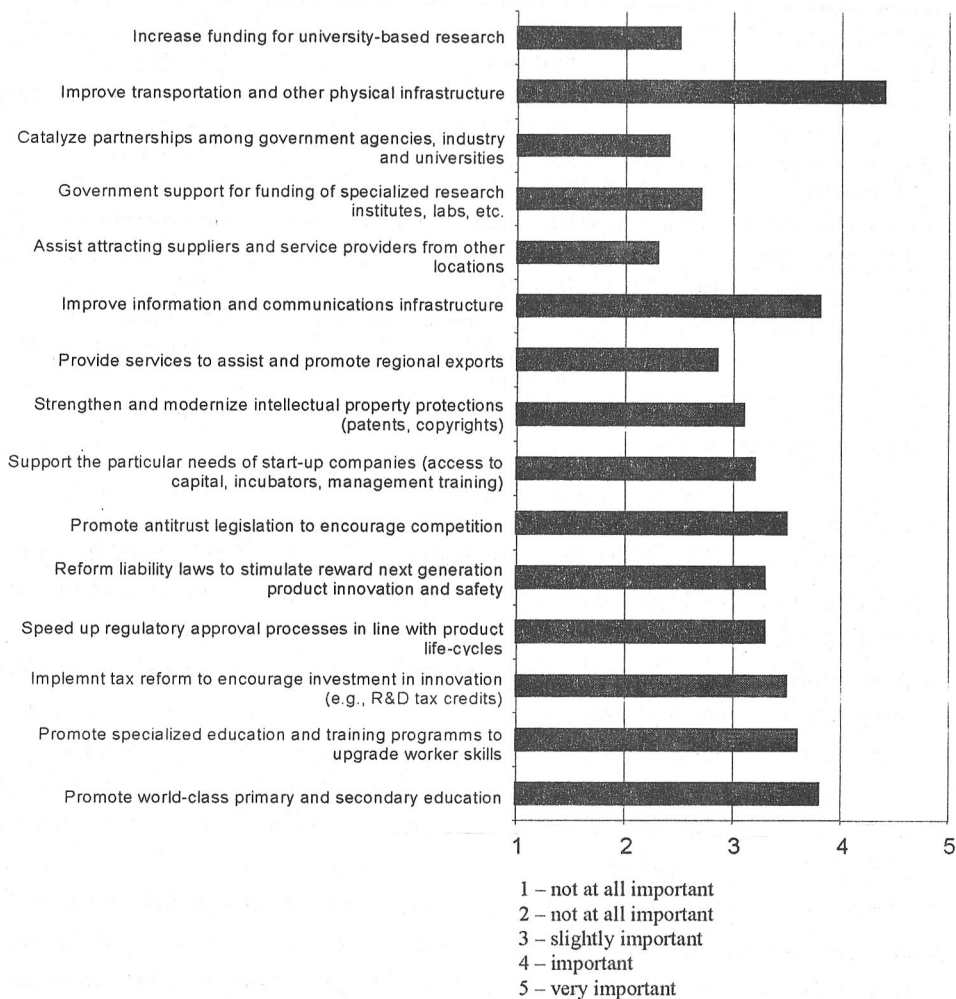
The most frequent barrier to wider exploitation of new technologies in the small and medium enterprises sector is considered to be the lack of financial resources, which includes firms' own lack of resources, high interest and bank guarantee rates and taxes.

The pro innovative character of many small and medium enterprises is also indicated by a survey carried out by the Statistical Office of the Slovak Republic in 2000 (*Innovation and Manufacturing in the Slovak Republic 2000*), which finds that innovation in SMEs is oriented towards improving working conditions in order to increase labour productivity.

While it appears that the cooperation between small and medium enterprises, private research institutes, universities and public sector research institutes has had a stimulating effect for business (according official survey), the regional tax system and system of incentives has not summarised the results (see Figure 3).

Figure 3

Priorities for the Government in the Next Five Years



3.2. The Role of Academic Institutions in Innovative Activities

The second part of the investigations was focused on the university departments of the Slovak Technical University and selected institutes of the Slovak Academy of Sciences in chemistry, engineering and electronics.

We asked researchers to:

- rate the importance of different forms of technology transfer,
- evaluate cooperation with the business sector and the recent changes in demand for their research results,

c) evaluate what were considered to be the important issues relating to R & D in the region,

d) select priorities for the government.

Researchers consider informal relationships with entrepreneurs (rated 6.17) to be the most important form of knowledge transfer to the business sector. The most often used forms of technology and knowledge transfer are consultations, seminars, analyses, advisory, informal relations, access to information sources in research centres and scientific papers.

Secondly, joint research projects (6.0) and the employment of university graduates (5.67) were also rated as important factors enabling knowledge transfer. Universities are excellent sources of two forms of knowledge transfer – by scientists and graduates, namely via the employment of graduates and by the use of library sources.

Table 8

Analysis of Knowledge Transfer

	Importance	Scores (1 – 7)	Importance
1. Consultation	Not important	5.22	Very important
2. Seminars and conferences	Not important	4.44	Very important
3. Required analyses	Not important	4.94	Very important
4. Advisory meetings	Not important	5.39	Very important
5. Joint research projects	Not important	6.0	Very important
6. Informal relations among scientists and employees of private firms	Not important	6.17	Very important
7. Associations	Not important	4.41	Very important
8. Patents	Not important	4.47	Very important
9. Licenses	Not important	4.59	Very important
10. University facilities utilized by private firms	Not important	4.82	Very important
11. Establishment of private firms by researchers	Not important	4.39	Very important
12. Employment of research workers in private firms	Not important	4.65	Very important
13. Establishment of incubator centres by university or research centres	Not important	4.71	Very important
14. Employment of students in private firms	Not important	5.22	Very important
15. Employment of university graduates	Not important	5.67	Very important
16. Use of library	Not important	4.83	Very important
17. Use of information sources in research institutes	Not important	5.39	Very important
18. Presentations at fairs	Not important	5.06	Very important
19. Professional journals	Not important	5.44	Very important

The problem of communication with a sector of small and middle enterprises still persists. Major part of contracts with business practice is provided on the base of personal contacts of scientists. Approximately one half established contacts are from the period before 1989. Researchers see the benefits of mutual contacts with SMEs in terms of financial, practical and educational rewards. Although the

demand for research results from the business sector still remains rather low, we can see a slightly increasing trend in recent years as indicated by 58 per cent of interviewed research institutes.

Generally speaking, although Bratislava region is well endowed with the basic research facilities and qualified scientists, the research institutes rarely transfer knowledge to firms. According to the findings, the large and flexible pool of skilled workers indicates that the labour force is not a significant barrier to the adoption of new technologies and work techniques in SMEs. In contrast, the lack of financial resources, due for instance to high interest and bank guarantees rates, present a formidable barrier (NADSME, 2000). Also our research shows the difficulty in accessing risk capital in the region, and highlights the inhibiting role of the regional tax and incentives system for business expenditures on research and development.

Conclusive Remarks and Policy Recommendations

We observed how both business and research evaluated and prioritized the different strands of government policy. Figure 4 shows the overall results of the study. The vertical axis is the scores given by research and business sectors, and it shows that the top priority for the research sector was to increase the funding for basic university research and the increase of governmental support for the funding of specialized research institutes.

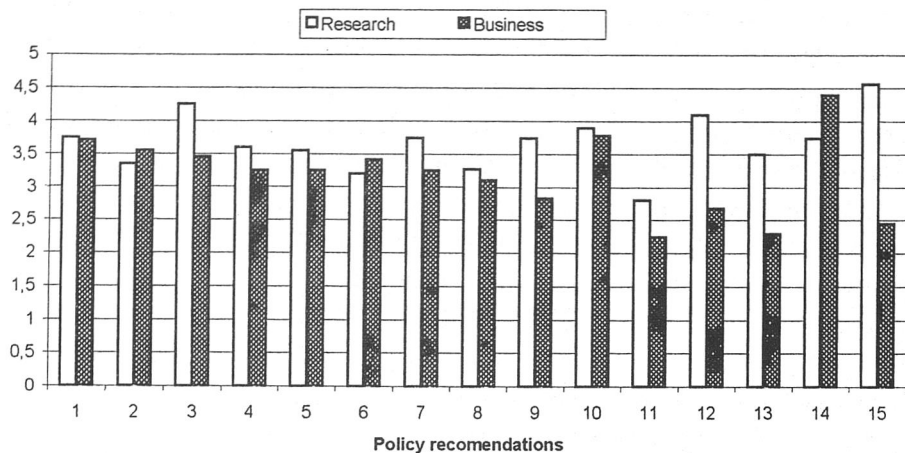
Research at universities and research institutes is currently crippled by financial problems so that researchers are forced to find resources outside the centres. However increasing funds for the research activities in these institutes could lead to a decline in cooperative efforts with the business sector. Increasing funding in the research sector was evaluated as only being slightly important by the business sector.

For business, the improvement of the information and communication infrastructure was the top priority, and was also considered to be highly important by the research sector.

The second priority for the research sector was to implement tax reforms to encourage investment in innovation (R & D tax credits); this in line with our earlier remark that both sectors thought that the regional tax and incentives system did not encourage business expenditure on research and development. The business sector very much preferred the raising of educational standards such as the promotion of world class primary and secondary education and specialized education and training programs to upgrade worker skills, which they considered to be very important for their innovative activities.

Figure 3

Priorities for the Economic Policy of the Government in Next Five Years



- Promote world-class primary and secondary education
- Promote specialized education and training programs to upgrade workers skills
- Implement tax reform to encourage investment in innovation (e. g., R & D tax credits)
- Speed up regulatory approval processes in line with product life-cycles
- Stimulate production of innovation
- Promote antitrust legislation to encourage competition
- Support the particular needs of start-up companies (access to capital, incubators, management training)
- Strengthen and modernize intellectual property protections (patents, copyrights) at home and abroad
- Provide services to assist and promote regional exports
- Improve information and communications infrastructure
- Assist in attracting suppliers and service providers from other locations
- Government support for funding of specialized research institutes, labs, etc.
- Catalyze partnerships among government agencies, industry and universities
- Improve transportation and other physical infrastructure
- Increase funding for university-based research

Our investigations have showed there is a huge potential for recognizing the importance of innovation, but on the other hand, increased innovation is not closely linked to elaborated cooperation with research institutes. Knowledge transfer tends to be focused on internal problems, such as firm management and informal contact with other firms.

This situation is influenced by insufficient knowledge transfer between research institutes and firms and by firms concentrating on their own activities, which absorb all their interests. Many firms struggle for survival, and for them, the innovative approach represents new management or new contacts with other firms. The institutions promoting knowledge transfer exist, but there is no agency that can help to promote knowledge transfer directly. One of the possible ways this might have been achieved was by the foundation of an agency within the Slovak Academy of Sciences in Bratislava where direct contact between research institutes and firms could be organized. However, this strategy failed because of insufficient financial support and a lack of balance between the research orientation of the institutes and the imprecise directives embodied in official legislation.

The issue of poor legislation is very important, because its imprecision prohibits different research institutes from becoming involved. A lack of capital investment funds means that there is no possibility of establishing small companies as a way to produce practical outcomes from research activities initiated by research institutes. Researchers who want to continue in these activities could perhaps establish their own branch company and put up a share of the capital. The remaining share would come from research institutes or universities and from industrial companies. The new company, a so-called spin off company, would be a separate entity detached from the university or research institute. However, the legislation necessary to make this possible still does not exist. This lack of supporting legislation also has a negative influence on basic research and its orientation, which is not focused on practical application and lacks financial support.

The manner in which applied research is conducted in different applied research institutes has changed completely. This situation is because of two reasons. One of these is that applied research institutes attached to enterprises and factories were dissolved during the privatization process and have not been re-established – so the tremendous potential for technological transfer which was very much exploited during the previous era, has ceased to exist. Secondly, research strategy and applied research is now conducted in small firms attached to large factories (not SMEs), or in small firms attached to universities. This situation calls for the passing of new legislation aimed at promoting the establishment of different research branch companies and regional centres, and not simply incubator parks.

The decentralized innovation policy with its own instruments includes for instance proposals for the foundation of regional innovation centres, which can help to improve this situation. On the other hand, it is necessary to also improve the financial situation of SMEs in such a way that they will become interested in their own R & D activities and strengthen their own direct contacts with small spin-off organizations with research programs and activities.

To sum up, the outcome of our investigations has been to show that in spite of the fact that Bratislava has a large industrial and research centre with many possibilities for mutual contact between firms and research institutes and universities, it does not, in reality, make full use of the opportunities that exist. Some of the reasons mentioned above include ineffective contact between research institutes and SMEs, ineffective legislation and lack of finance, which have negative effects on the incidence of mutual contact among firms, their internal management, etc. One of the possible ways out of this conundrum is through regional tax reform.

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MALÉ A STREDNÉ PODNIKY A ICH ÚLOHA V REGIONÁLNO M ROZVOJI (PRÍKLAD BRATISLAVY)

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V prezentovanom článku sa skúma, ako decentralizovaná inovačná politika podporuje rozvíjanie inovácií v oblasti malých a stredných podnikov (MSP). Tým sa zároveň stimulujú vzniknuté kontakty medzi malými a strednými podnikmi a univerzitami a vysokými školami, alebo vznikajú iné formy kontaktov. Pre regionálnu politiku by malo byť dôležité zistenie, či existuje skutočný vplyv regionálnej a inovačnej politiky na priemyselný sektor, a najmä na priemyselný sektor v oblasti MSP.

Úloha malých a stredných podnikov v ekonomickom a regionálnom rozvoji Bratislavy je veľmi významná, takisto aj ich spolupráca s výskumnými ústavmi a vysokými školami. Práve preto sa prvá časť článku venuje diverzifikovanej hospodárskej štruktúre regiónu, analýze financovania vzdelávania vedy a výskumu, vedecko-technickej a inovačnej politike štátu, ako aj analýze systémových podmienok pre podporu malého a stredného podnikania, najmä na národnej úrovni.

Samotným predmetom článku je postavenie malých a stredných podnikov v regióne Bratislava a ich spolupráca s výskumnými ústavmi a vysokými školami. Článok je postavený na prípadovej štúdii, ktorá sa realizovala v rámci Ekonomickej univerzity v Bratislave na Katedre regionálneho rozvoja a geografie. V tejto štúdii sa skúmal vzťah vybraných MSP z oblasti chemického, elektrotechnického a strojárského priemyslu k výskumným ústavom z hľadiska povahy technologického a vedomostného transferu, ocenenia faktorov dôležitých pre inovačný potenciál a priorít pre politiku vlády.

Druhá časť príspevku sa sústredila na výskum kooperácie medzi zodpovednými výskumnými ústavmi a katedrami vysokých škôl (chemicko-technologickými, elektrotechnickými a strojárskymi) a MSP. Sústredila sa na štyri typy otázok: zistenie rôznych foriem technologického transferu, stupňa významnosti pôsobenia rôznych inštitúcií vedy a výskumu v danom regióne, spolupráce podnikateľského sektora s výskumnými a vedeckými ústavmi, a určenia priorít pri inštitucionálnej podpore spolupráce medzi malými a strednými podnikmi a výskumnými ústavmi z hľadiska inovačnej politiky. Výsledky tu prezentovaného výskumu sú mienené ako odporúčania pre regionálnu politiku. Hlavným zámerom je potvrdiť prínosné spojenia medzi inováciami a regionálnymi aspektmi ekonomickej aktivity malých a stredných podnikov, pričom sa berie do úvahy predovšetkým špecifické postavenie regiónu Bratislavy, v rámci ktorého sa nachádza množstvo MSP a výskumných ústavov.

Podkladom pre výskum bola aj práca, ktorá vyšla v Štatistickom úrade SR v roku 2001 *Inovačná aktivita v spracovateľskom priemysle v rokoch 1997 – 1999*, a výskumný projekt, ktorý realizovala Ekonomická univerzita vo Viedni, Katedra regionálneho a mestského plánovania pod vedením profesora Eduarda Bergmana.

V článku sú inštruktívne odporúčania pre regionálnu politiku, ktoré sa zameriavajú hlavne na vytvorenie legislatívy, umožňujúcej formovať malé odštepne organizácie, tzv. *spin-off* výskumné organizácie. V týchto organizáciách by sa mohli experimentálne realizovať vedecké projekty do podoby praktickej realizácie, tzv. vývoj *sui generis*. Legislatíva umožňujúca vytvoriť takéto pracoviská, a najmä vytvoriť možnosť pre vedeckých a univerzitných pracovníkov pracovať v takomto type organizácií, je už pred schválením v Českej republike, a nemala by ho obchádzať ani legislatíva Slovenskej republiky.

Príspevok je však zasadený do širších charakteristík bratislavského regiónu a širších ekonomických súvislostí v rámci SR, ktoré zdôrazňujú špecifické postavenie malých a stredných podnikov, a takisto inovačnú politiku, ktorá ovplyvňuje postavenie univerzít a výskumných ústavov a ich kooperáciu s MSP.

Rovnako dôležitá je aj otázka selekcie troch najprogresívnejších odvetví priemyselného sektora (chemicko-technologického, strojárskeho a elektrotechnického), ktoré sú v rámci SR, a najmä Bratislavy v oblasti MSP najproduktívnejšie, a definovanie ich spolupráce so zodpovedným typom výskumných ústavov a univerzít.