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Innovation network building in the Hungarian region of South Transdanubia

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Innovation Network Building in the Hungarian Region of South Transdanubia

by

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Abstract: The economic attraction of the regions depends on the spatially balanced network-based co-operation of different research bases, SMEs and organisations involved in innovation development these days. The research on regional innovation examines the correlation between regional innovation development, innovation potential and the innovation networks. This study summarises the research trends on the innovation network theory and introduces experiences of the European network building in order to gain best practice in the introduction of network-oriented regional innovation development for the South Transdanubian region. After the introduction of the innovation endowments of the region I discuss the database of the potential network actors and organisations, the possible phases of the regional network building and the preparatory works of the regional innovation strategy under implementation.

1. Introduction

In the developed countries, the increase of productivity is due in 80% to some form of innovation these days. *Innovation is vital* in the increase of the productivity of companies, the improvement of export abilities, the creation of employment, the improvement of the level of services, in one word: in the increase of social welfare. The change of innovation paradigm that took place over the past decades changed the structure of the innovation spaces and the organisational mechanisms of innovation (Cooke, et. al. 1998).

A general consensus exists on innovation-oriented regional development in the literature, in which the utilisation of the regional knowledge base, innovation potential and co-operation between businesses and research institutions continues to play an increasing role in regard to business success and the competitive economic performance of a given region. Innovation is considered as an interactive and cumulative *system-like* process depending on traditions, with definite *spatial forms*. In the past few years we have seen new approaches in the understanding of the role of innovation network in successful regional development and a great deal of research has been done on regional networks and linkages with the reference to 'network paradigm'. Models have shifted from linear and firm-based microeconomic concepts towards the systemic approaches. Innovation networks can be observed at various spatial level, supporting the arguments of Camangi (1991), Cooke and Morgan (1993) global, national and regional systems have been discussed in recent literature (Braczyk et al. 1998).

The researches on the innovation theory and methodology carried out in the 1990s aimed at the exploration of the tight correlation between regional development and technological changes, and the relations between the regional innovation potential and the innovation networks (Cooke 1996, Tödtling 1994). These researches primarily focused on the mutual interdependencies and the junctions of the feedback can be seen within the companies (e.g. among the processes of distribution, marketing, R & D and production), among the companies (relation to the customers and the suppliers) and among the different organisations. A significant part of these dependencies often go beyond the traditional market connections and is manifested in the form of "networks" which create more stable connections organised on the ground of trust, allowing the creation of common networks mediating and sharing

innovation, information and knowledge (Cooke and Morgan 1993; Tödtling 1999). The connection to these networks is of decisive importance primarily for the small and medium size enterprises and the local actors, as the connection provides a local access to the global mass of information and knowledge. These characteristics necessitate the survey of the location factors and the regional dimensions of innovation networks.

For the creation of the competitiveness of regions it is necessary to spread knowledge and innovation capacity in a broad circle. For the backward regions, the utilisation of the new economic possibilities offered by the information society can be a breakout point, by increasing their innovation capacities. From this aspect, the development of higher education and research is indispensable, with special regard to their relation to industry and companies. The economic attraction of the regions and the spread of knowledge also depend, however, on the spatially balanced network co-operation of the different research bases, small and medium size enterprises and organisations involved in innovation development.

In this essay I summarise recent research trends on the innovation network theory and try to introduce experiences of the European network building in order to gain best practice experiences in the introduction of network-oriented regional innovation development for a transformation region in Hungary. In the latter part of this study I present the preliminary findings of a survey serving the preparation of the innovation strategy for South Transdanubia mapping the institutional system of innovation in the region and attempt to give recommendations for innovation network building relying on European experiences and fit for the recent situation of innovation in the region.

2. The innovation network theory and the European dimensions of innovation network building

Since the key contribution from Cooke and Morgan (1993) to the ‘network paradigm’, regional innovation network have been viewed as stimulating growth and innovation from both microeconomic perspective and a regional perspective. This hypothesis is supported by the concept of innovative milieu, the regional innovation system approaches and the transaction cost theory (Sternberg, 2000). Cooke and Morgan (1993) have observed the network as a certain form of regional governance and supportive institutional infrastructure, which foster interaction, sharing, co-operation and trust as means of securing the economic co-ordination between firms, universities and regional authorities. In their argument the use of networking is an explicit growth strategy for regional development authorities in the process of regional institutional building (Cooke, 1996). Regions differ in their capacity to built relevant institutions and governance models, depending on their decision-making power and financial resources and their policy orientation (Braczyk et.al. 1998). The strength of the individual organisations depends on links with customers, suppliers, distributors and competitors. This strengths arises from learning by co-operating which networking encourages. Networking, as one major form of the ‘associational economy’, itself can take place at a number of different levels and between different types of organisations viz. firms, linkages between firms, linkages between firms and public sector agencies and linkages between regions (Morgan et al. 2000).

In the consequence of the emergence of the new network paradigm is rather difficult to make a systematic and extensive overview especially since the network is interpreted quite differently. According to Castells’ view networks are open structures, able to expand without

limits, integrating new nodes as long as they are able to communicate within the network, namely as long as the network participants share the same communication codes, values and performance goals (*Castells, 1996*). The main advantage of networks is the utilisation of complementary resources, which an individual actor does not have at his own disposal. The importance of interacting in innovation processes makes it clear that networking is an appropriate means of knowledge exchange and learning. According to network economics, network is defined as a long-term relation of different partners who cooperate on the same hierarchical level in an environment where market transactions are characterised by temporary interactions, mostly regulated by contracts. Individual network actors are connected by horizontal, less hierarchical and trustful relationship (*Koschatzky, 1999*). Bringing together different partners into networks not just explained by cost aspects but through the realisation of synergy effects and strategic interests, economic potentials can be exploited which have been under-utilised so far. Within networks, both vertical and horizontal relationship exists. However, despite the increasing role of co-operative and horizontal networks in business relations, hierarchical relationship between businesses remain more frequent (*Dicken & Thrift, 1992*).

The theoretical and practical research of the regional innovation networks and regional innovation systems has shifted innovation from the micro-economic (company level) approach to a spatial, regional (global) perspective (*Sternberg 2000*). The question of the integration of local and regional (intra-regional) networks into national and global networks plays an essential role in network studies. Through linkages to intra-regional networks can be connected to international and global networks, and innovation potential of regions is determined to a large degree by their integration into interregional innovation networks. As Castells noted, network enterprises increasingly international, and its conduct will result from the managed interaction between the global strategy of the network and the nationally/regionally rooted interests of its components (*Castells, 1996*). Globalisation and regionalisation, however, represent both sides of the coin, which constitute a certain consensus in the network studies. In the period of globalisation, regional innovative linkages retain their importance for the business sector in most regions. Despite the development of the global networks of the companies connected to each other in the international arena, we can see the strengthening of the region as an economic entity, because globalisation increases the geographical (local-regional) clusters of production (*Cooke 1995, Porter 1990*). In some extent, networking can compensate for inadequate internal resources, but without the ability of managing network relations and integrating the transferred knowledge into their own production and managerial activity, firms would also not be able to handle networks and to benefit from learning process (*Koschatzky, 1999*). It is argued that without intra-regional network linkages for local businesses it would be more difficult to gain access to the globally available knowledge. (Nonetheless knowledge is always developed and utilised locally (*Kogut et al. 1993*). Co-operations among networks solve the main obstacles of the flow of knowledge and information, also, by the synergy effects, the knowledge scattered in the units of the network adds up and multiplies (*Döry-Rechnitzer 2000*).

In *Sternberg's* (2000) argument it is undisputed that the interconnected intra-regional and global networks have a significant importance mainly for the small businesses gaining the most form of integration through the regionally-based network which offer them an easier access to global information and knowledge networks (*Tödtling, 1994*). The main focus on

this issue is the global/local interface as the spatially determined connection between the forces, which expose more local firms to international markets. This highlights the importance of the spatial proximity in the network studies. According to *Porter (1990)*, it is the spatial concentration and geographical proximity that facilitate networking. Close geographic proximity within the nation and concentration of an industry heightens the influence of the individual determinants within the networks, which is the combination of national and intensely local conditions that foster competitive advantage (*Porter, 1990*). From a regional point of view proximity favours those co-operation processes which rely on trustful relations and close face-to-face contact. The region therefore is an arena where networks of local, regional and supranational relationship develop in the form of market-based and non-market related interactions, exchange of information and formal and informal co-operation.¹ Innovation networks are the main characteristic of the concept of regional innovation system and between network and regional innovation potential has a strong connection (*Cooke 1995; Braczyk et al. 1998*). The regional innovation potential includes all factors advancing or hindering the innovative capacity of the regions and is determined to a large degree by the linkages between different innovation actors and their integration into regional innovation networks (*Cooke et al., 1998*).

To describe the relationship between regional innovation potential and the intensity of networking in the field of innovation, it is necessary to gain empirical evidence on the qualitative and quantitative assessment of determinants crucial for the innovation potential and on the spatial range of innovative linkages of any region. The most recent contribution to this kind of empirical representative research is the European Regional Innovation Survey (ERIS) project that covers 11 European regions in order to analyse innovation linkages in a broad representative basis. The selection of the case study regions demonstrates a wide variety in terms of the regions' typology (Global hubs/gateway cities; Regional metropolis, Peripheral regions/transformation regions), economic basis and innovation potential. This survey could serve as a benchmarking base for similar analyses and implementation of regional innovation strategies in the accession countries (*Sternberg, 2000*).

The ERIS project explores network relationships among three groups of innovation participants: manufacturing firms, business services and semi public research institutions. The results of this survey were published in several studies, contributing to the better understanding of innovation processes, innovation networks and co-operation patterns, particularly from the firms' point of view. The general results show that innovation intensive firms are more active in networking than the less innovative firms. Firms with access to external knowledge through networking activity are more successful economically than firms that do not cooperate with partners. In particular service firms rely more on external sources than manufacturing firms do (*Koschatzky, 1999*). In general, vertical networks play still a more significant role than horizontal ones. Collaboration in vertical networks is realised over larger physical distance than in horizontal networking. According to *Koschatzky's* finding for manufacturing firms, vertical interactions (with customers and suppliers) are of higher

¹ Through the intraregional networks, the local actors have a chance to join the global networks. In the realisation of global capital investments, the process of globalisation, strengthening the tendencies of regional specialisation and relying on the local economic actors and the supporting institutional infrastructure, builds to a great extent upon the local-regional factors of location and competitive advantages. Within this latter, the local innovation potential and the structure of regional innovation infrastructure are crucial.

importance, with the customers being located outside the region and the suppliers inside. However, spatial proximity is important especially in horizontal co-operation with research institutes as relations between firms and universities and R & D institutions are more often realised within the region, due to the importance of personal contacts and other reasons. Universities and other R & D institutes, however, co-operate mainly on interregional and international bases but their bridgehead to international knowledge pools is available for regional firms. *Koschatzky* finds that within regional and national innovation systems co-operation barriers are much lower for manufacturing firms than between different innovation systems (cultural barriers). Concerning the size of firms it can be seen that small firms show a high preference for local and regional co-operation partners, as they have a much more engaged in intraregional co-operation than large firms therefore spatial proximity more important for SMEs who usually do not cooperate on international scale. On the other hand, small firms have less linkages with universities and research institutes, while medium and large firms make much more use of this information and knowledge pool. Co-operation with service firms however is less confined to the region and also customer relation many times reach beyond the region, but the links to research institutions, universities and innovation services are rather intraregional. Besides size and sectoral pattern, technology and knowledge intensity also influence co-operation activity as high-tech industries have a greater need for intra- and interregional networking than industries operating on a low-tech base.

One of the general findings of the survey is that small firms depend greatly on the supportive quality, organisational framework of their regions and the innovation related knowledge available there. However there are also regional differences, since firms in central regions have better preconditions not only for intraregional networking but also for interregional networking. It appears that firms located in peripheral areas might face deficits in knowledge supply, which negatively affects their innovative performance.

One of the major arguments of the ERIS survey is that the regional environment and spatial proximity to which the firms belong to really matters in the innovation process. This is more important for the smaller firms than for the larger ones and more for the science-based relations than for the production and market oriented linkages. This survey reveals that the spatial and institutional proximity within the regional innovation system plays a very significant role, even in the era of the globalisation² (*Koschatzky-Sternberg, 2000; Tödting, 1999*). In general, innovation is still a rather internal process to the SMEs, as they rely on their own endogenous sources and on the external sources of R&D and marketing³. *Tödting and Kaufmann* (1999) rank the different co-operation partners and find that customers and suppliers are the most important innovation partners, while support organisations play a less important role even in the central regions. In spite of this result the co-operative interactions

² The regional dimension of the *network and institutional system of innovation* is decisive from several aspects: Relations among the actors dominant from the aspect of innovation, are more and more local and regional, thus the geographical proximity is decisive.

The industrial clusters organising along the needs and interests of local businesses assist the international competitiveness of the regions. These clusters have a positive contribution to the birth of regional innovation networks.

Development of the innovation networks depends on the local socio-cultural and institutional environment. The knowledge of local economic-social-political milieu promotes regional synergies. (*Cooke 1996, Camangi 1991*).

The regional level is optimal for the organisation of the institutional framework of government, industrial and technological supports.

³ The most important are the relations along the value chain (customers, suppliers), supporting Lundvall's (1992) findings, and other relevant interactions are with consultants, universities and R&D units.

and network type relations are becoming more important. In their research, that compares six regions, universities ranked high position, indicating the strengthening university-industry linkages. On the negative side they found only limited evidence on the horizontal co-operation among firms and technology transfer and other support organisations, and these latter were used slightly by SMEs (*Tödtling & Kaufmann, 1999*).

The ERIS project reveals that the spatial range of innovative linkages significantly depends on the size, the type of co-operation partner, the R&D intensity, the sectoral basis and the location of the analysed manufacturing firm. For instance the higher the technology intensity of the industry, the greater is the need of each firm to utilize intraregional knowledge through innovation networks. It is therefore an important task of the innovation-oriented regional policy to promote network building among firms and other actors of a regional innovation system and interlink these regional networks to the national and global knowledge pools.

In the framework of the ERIS programme, three less developed East-Central European regions, Slovenia, Saxony and the Western Transdanubian region of Hungary were comparatively surveyed on the same basis. The result was shown that the co-operation intensity was the lowest in the Hungarian region and the innovative linkages are very shallow comparing to the other two regions (*Döry, 2001; Koschatzky 2001*). One of the major aims of this kind of empirically based assessments on innovation networking is to serve as a policy tool for regional innovation strategy making and regional innovation measures. It is important to pay attention to the selection of the priority of the strategies in order to secure that only those programmes could gain priority which are based on real business demand underpinned by empirical surveys. The other importance of the innovation promotion is to build and coordinate regional networks. Since most of the science-led initiatives to promote networks are rarely successful, therefore business community, regional policy institutions or supporting institutions have to play the key role in the organisation process of such networks.

It is seen in European context that the number and the quality of intraregional innovation networks can be increased by the means of policy instruments. It is supported by the theory of 'institutional Thickness' by *Amin and Thrift (1992)* or by *Cooke and Morgan (1998)* or *Bob Morgan et al. (2000)*, a notion on associational and political economy. It can be said as a decrease of importance of the 'hardware' components within regional policy (e.g. infrastructure) and simultaneously the significant increase of 'software', tacit and institutional components that aims to improve the non-physical conditions for co-operations between innovation actors (*Koschatzky-Sternberg, 2000*).

As a matter of fact, there is lots of other success factors in the case of different regional innovation strategies and networking. Depending on the specific economic and social structures of the regions and the different innovation potentials, innovation strategies which proved to be successful in one region, might not be successful in another region. What is needed is the identification of strategic and sector specific priorities based on the analyses of the specific regional demand and trends affecting the regional economy, the awareness building among actors in order to properly define the strategic guidelines for further project implementation. There is a wide consensus in that no general policy approach and co-operation pattern can be applied to different types of regions, as regional innovation policy has a very strong regional and sectoral specificity.

The ERIS case regions show different patterns of networking and organisational character. In the case of Wales, it exhibits an old type of industrial (peripheral) regions under

reconstruction, possesses a rather modest R&D infrastructure but it has strong and very active political institutions and actors and has shown a conscious development strategy for utilising and promoting intraregional networking. The government body (Welsh Office) and the Welsh Development Agency (WDA) are played a major role in the modernisation of the Welsh economy. Among co-operation partners public and semi-public support organisations play a major role, while links to other firms (consultants, suppliers, business services) are rare in the region. In the case of Styria and Tampere regions, mostly research organisations and universities are the main stimulators of networking, while in the core region of Baden-Württemberg inter-firm linkages are predominant (*Morgan et al. 2000, Tödtling & Kaufmann, 1999*).

For such peripheral regions as South Transdanubia, a more basic approach is necessary in network building which aims at the formulation of the regional innovation strategy and considers what kind of actors should build co-operative linkages. The European innovation policy considers the regions as important innovation areas where the network building within the business clusters and among them can be operated, supplementing each other. The major purpose of the European Commission supported Regional Innovation Strategy (RIS) programmes is to bring together potential regional actors in order to raise regional awareness in regional innovation actions and create a business oriented, publicly supported environment for the full exploitation of regional innovation potential and for overcoming the recent fragmentation of regional systems. Within RIS, network building plays a major role primarily supporting SMEs relying on the basis of the local endowments.

According to *Landabaso* (1997) the inadequate intensity of the innovation effort by the public sector and particularly by the private sector, and its poor adaptation to the specific needs and conditions in the less developed regions (due to the lack of understanding of the innovation process at regional level) increase the spatial polarisation and technology gap between regions. The RIS strategies should promote public-private partnership and co-operation among the economic actors with the creation the institutional conditions, general consensus among the key players for a more efficient use of public and private resources in the promotion of innovation (*Landabaso, 1997*). RIS could guarantee the development of the regional synergy among the actors and the safe operation of the economy. Within RIS one focus could be directed towards small firms which usually lack access to interregional innovation networks and their co-operation ability with other firms and organisations are lower than that of the larger firms. SMEs would not be able in the short run, without a national or regional system of support institutions, to utilise the advantages, because the small and medium size enterprises would not be able to spend significant amounts on innovation without the assistance of the network institutions. This low co-operative ability of SMEs lies in the deficits of network management and the lack of resources for utilising external knowledge and information. This relates especially to the low share of university-firms co-operation. On the other hand universities as the potential knowledge source for firms located in their vicinity, are less integrated in their respective region, since they cooperate mainly interregionally and internationally. Therefore one of the major policy goals should be the stimulation effect on co-operation between small firms and research institutes in a region with less developed interregional innovation linkages. This policy has to be based not on the organisation of individual actions but on long-term continuous co-operation, exchange of information and co-operation. The main co-ordinator of network building is a decentralised and SMEs oriented expert-management institutional system (*Gál 2000a*).

3. The general situation of innovation in South Transdanubia

3.1 The national context

Over the recent decade, there has been a rapid increase in Hungary in the number of innovation-oriented small and medium size enterprises, which are spatially less concentrated and their needs are not necessarily concerned with high tech industry developments. These new demands and the change of paradigm going on in the innovation concept place a much bigger emphasis, besides the R & TD activity, on the establishment of the wide and decentralised institutional network promoting knowledge and technology transfer. In addition to the revitalisation of the traditional network of R & D institutional systems, a multi-polar innovation system with much more actors is needed, in which the distribution-oriented “knowledge bases” co-operate in a network. The elements of this institutional network, on the basis of the science and technology parks, innovation and technology development centres and the smaller transfer centres, realise a connection and network building among the economic actors which is more and more wide-ranging and better adapts to the conditions of the local-regional environment. The types of resources involved into innovation field can include specific assets that are only available in a certain place and these assets usually depend on spatial proximity.

In the European Union there has been an interest at the sub-national level in creating new forms of networks and co-operative business relations on interregional and interregional level as well. The working out of the regional development programme of R & D, together with the other elements of innovation, is important because the development of the regional production systems, the utilisation of the inner regional resources and the fundamental improvement of the income generating capacity of the regions, the expansion of the export capacities cannot take place without the building out of the regional innovation networks (*Horváth 1999*). The role played by the state and the public sector is central to the promotion of decentralisation in innovation. The public sector should play a significant role also in the creation of regional innovation networks.

A critical component of the innovation system of a region is the infrastructure of R & D institutions located within it as well as the internal and external networks of relationships within and between public agencies and private actors. For the decentralisation of the institutional system of innovation, it is necessary to create the regional innovation strategies for the regions. This is a parallel process to the modernisation and regionalisation of the institutional system of innovation. There are certain factors, listed below, which have to pursue in the creation process of a decentralised regional innovation policy:

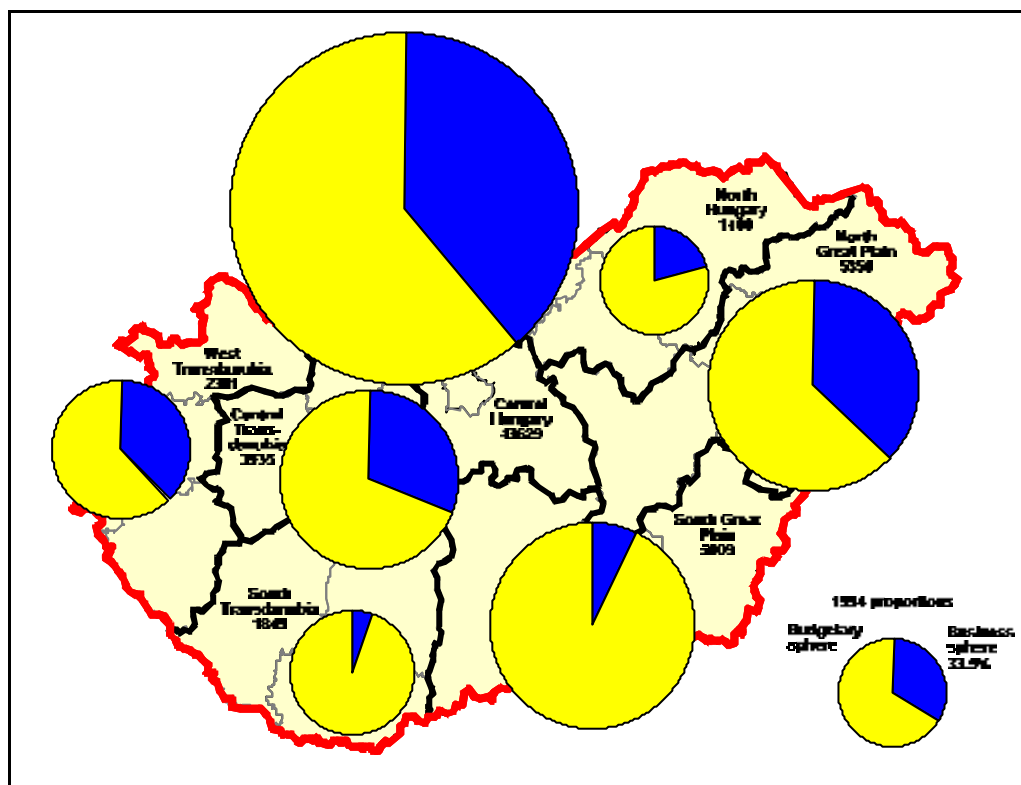
- In the development strategies of the Hungarian regions, the experiences of EU countries in the field of the development of the innovation institutions have to be asserted.
- Presently the conditions for the product and technology change are unfavourable in Hungary, with the exception of Budapest. The central region, using the locational advantages of the major part of the institutions, filters out a significant share of the R & D and innovation activities (*Figure 1*).
- In the future, the institutional system of R & D and innovation will have to be decentralised. On the basis of the recommendations stated among other things in the National Regional Development Concept and the Széchenyi Supporting Scheme, the further decentralisation of the excessively Budapest-centred nature of innovation and “knowledge base” is indispensable.
- At regional level, in the *regional innovation centres*, the institutional representation of innovation and technology policy and the organisational system co-ordinating the

innovation networks have to be established together with its management bodies (Gál, 2000a) (Figure 2).

Taking the European experiences and the Hungarian experiences gathered so far, and also the trends, the change of technology, the establishment and modernisation of the innovation system should be done in Hungary, including South Transdanubia, at a regional scale.

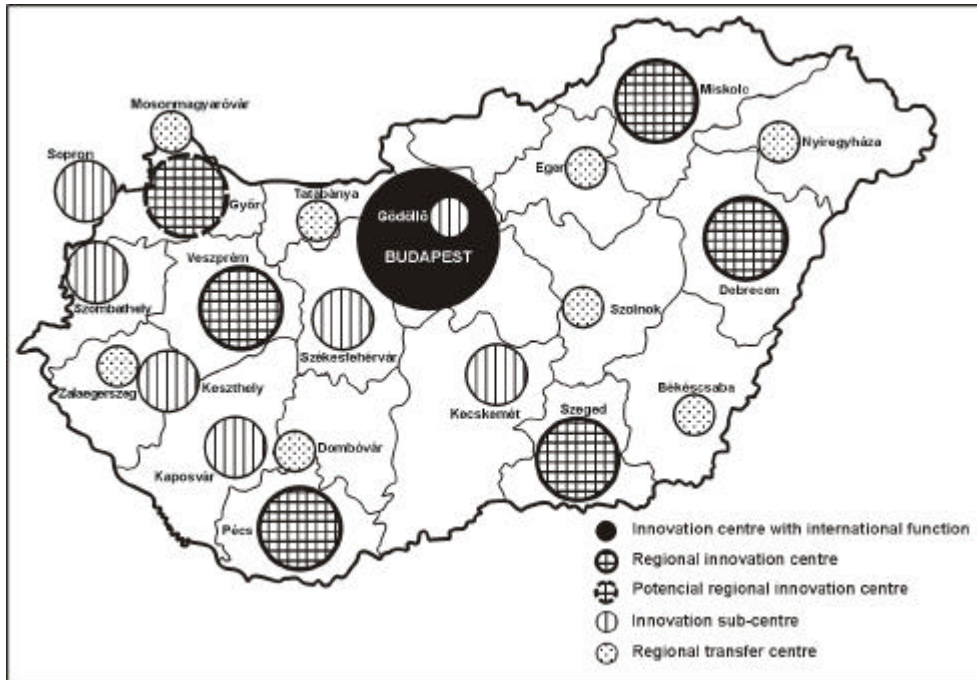
Figure 1

Regional breakdown of research and development expenditure in Hungary, 1997, (HUFm)



Source: Research and Development, (KSH-Central Statistical Office) 1997.

Figure 2
Potential regional innovation centres in Hungary



Source: Own construction on the basis of the National Regional Development Concept

3.2 The endowments of the region

South Transdanubia, as a region with one of Hungary's most important higher education centres and research bases, set as an objective, in order to alleviate the catching up with the developed Western European regions, the establishment of an effective innovation support system and the development of modern services promoting the industrial structure building on the well-trained labour force and the competitiveness of the SMEs of the region. The bases of this work are the own internal resources of the region and a well-elaborated regional development programme. At the level of the development programme, the definite intention for the improvement of the innovation development and adaptation is an integral part of the whole of the economic development chapter; this intention is based on the co-operation within the framework made by the university–higher education, the research and development bases and the SMEs.

Looking at the total of the historical advantages and disadvantages, South Transdanubia is a region in an average or better position by Hungarian standards. If we want to evaluate briefly the economic potential and relative development of the region, we can say that the competitive endowments of the region are not bad, but the peripheral transportation situation is a serious obstacle to development at present.

As regards the number of businesses compared to the population, South Transdanubia is the second in the order of the Hungarian regions, but the organisational structure is fragmented (dominated by small enterprises) and the SMEs are badly equipped with capital. However, the region can only assert a moderate attraction for the external, mostly foreign inward capital, and this is one of the main reasons why South Transdanubia is lagging behind in the field of economic performance measured by regional GDP. The most serious structural growth problem is the weakness of manufacturing industry, which can be seen in the regional GDP and the industrial export capacity. South Transdanubia, the region with one of the most

important higher education centres and research bases of Hungary, is in a favourable situation in terms of the culture, skills, education and quality of the people (*Hrubi 1999*).

3.3 The situation of innovation in South Transdanubia

The key to the structural transformation, sectoral rearrangement, the establishment of a competitive structure lies in the strengthening of the innovation potential of South Transdanubia, the technical and technological renewal, the creation of the service background of product and process innovation.

In the economic development of South Transdanubia after World War II, industrialisation had a leading role. Following the typical peripheral model of de-industrialisation, the structural transformation of the region took place from external resources, by extra-regional (central and business) decisions. In the de-concentration of the industry of Budapest – which also affected the industrialisation of South Transdanubia –, the few innovative, vertically organised large businesses located up-to-date technology into the big towns of the region, but these only specialised in the manufacturing of components, or the strategic decisionmaking competencies of product development and marketing remained in the capital city. It was a rare exception if the units of the same large company in the different counties established production links with each other. The internal economic cohesion of South Transdanubia was weak (*Horváth 1999*).

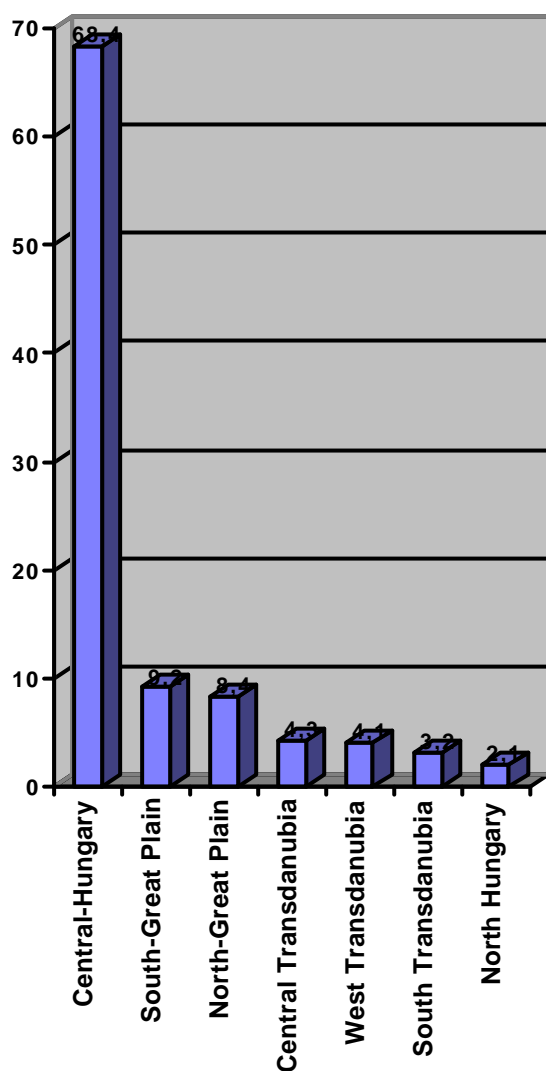
This former track of development had left such deep marks in the political and municipal decisionmakers of the region after the systemic change that they still saw the breakout points of the region in the traditional method, the mobilisation of external resources (they only saw privatisation and the creation of joint ventures as the essence of the restructuring).

The endowments of innovation are rather unfavourable in all three counties. South Transdanubia, similarly to the Great Hungarian Plain and North Hungary, showed semi-peripheral conditions in the early 1990s, whichever element of the innovation potential we see. What was characteristic of the innovation capacity of South Transdanubia in the beginning of the 1990s (*Table 1*)?

Technological skills were absent, there was no interest in the new technologies, the technical level of the goods produced here was low and the proportion of quality and designed products was negligible. The small enterprises almost exclusively produced for the domestic and the Eastern European markets. The co-operation capacities of the large companies are extremely weak, not one South Transdanubian large or medium size enterprise has been able to establish a strong network of suppliers, and although the value of industrial export of the region has significantly increased over the recent two years – because of the foreign joint ventures –, the export rate is still the lowest among the Hungarian regions. The majority of the businesses are not innovation-oriented: their market skills are deficient and they do not carry out an intensive marketing activity (*Horváth, 1999*).

By the figures of R & D, the lagging behind of South Transdanubia is obvious. Until the mid-1990s, South Transdanubia had the weakest R & D capacities among the Hungarian regions (in 1995, only 3.5% of the Hungarian R & D employees worked in South Transdanubia and only 1.5% of the inputs were spent here; also, the full-spectrum technical higher education is missing) (*Table 2*).

Figure 3
Share of the Hungarian regions in the R & D expenditure, %, 1999.



S

Source: Own calculation, Research and Development 1999. (KSH, 1999)

Table 1

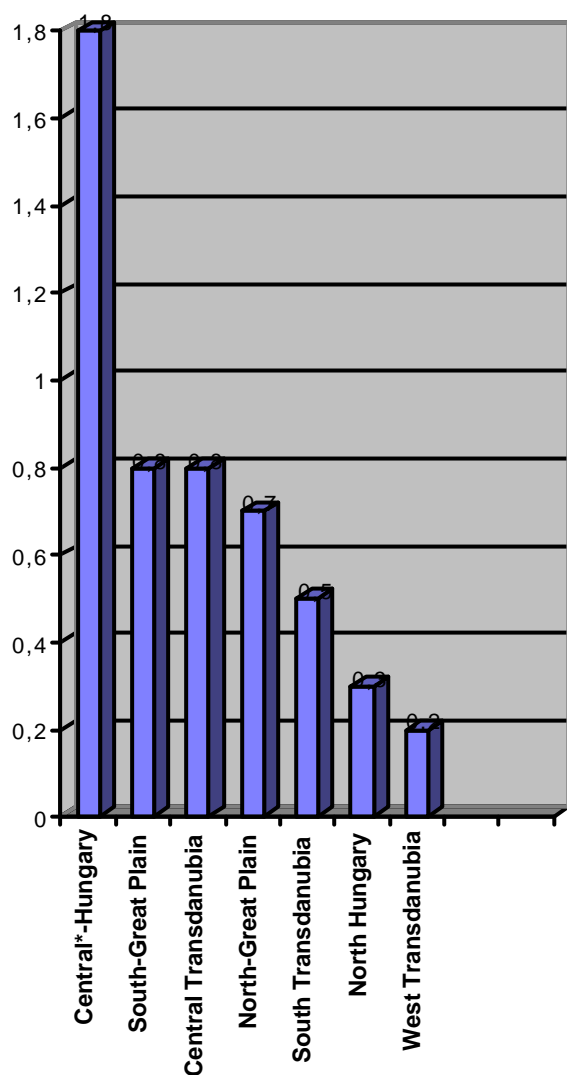
Share of South Transdanubia in the Hungarian enterprises with legal entity and in the innovation-oriented enterprises, 1999

| Region | Share in the total number of enterprises with legal entity, % | Share in the innovation-oriented enterprises, %* |
|---------------------------|---|--|
| South Transdanubia | 7,8 | 5,1 |
| Central Transdanubia | 7,8 | 8,7 |
| West Transdanubia | 7,3 | 7,9 |
| Central Hungary | 51,3 | 54,6 |
| North Hungary | 6,9 | 5,1 |
| Northern Great Plain | 8,9 | 7,9 |
| Southern Great Plain | 10,0 | 10,7 |

* Businesses with innovative profile (classification No. 7130 in the General Statistical Classification System of Activities), universities, polytechnics, research institutes, patent institutions were selected according to the database of the Yellow Pages of the Hungarian Telecom

Source: Yellow Pages of the Hungarian Telecom collected by Raffay, Z. (2001)

Figure 4
R&D expenditure, as percentage of GDP, 1999



Source: Own calculation, Research and Development 1999. (KSH, 1999)

Table 2 Basic data of R&D institutions in the South Transdanubian region, 1999

| Area | Number | Total staff number, person ^{a)} | Of which scientists and engineers | Expenditure ^{b)} | |
|--------------------------|--------|--|-----------------------------------|---------------------------|-------------------|
| | | | | million Ft | Percentage of GDP |
| Country | 1 887 | 42 088 | 24 609 | 77 454 | 0,76 |
| Within it | | | | | |
| Baranya County | 132 | 2 080 | 1 370 | 2 181 | 0,68 |
| Somogy County | 19 | 258 | 121 | 291 | 0,12 |
| Tolna County | 13 | 65 | 57 | 24 | 0,01 |
| South Transdanubia total | 164 | 2 403 | 1 548 | 2 496 | 0,32 |

^{a)} Applied to the full time employees

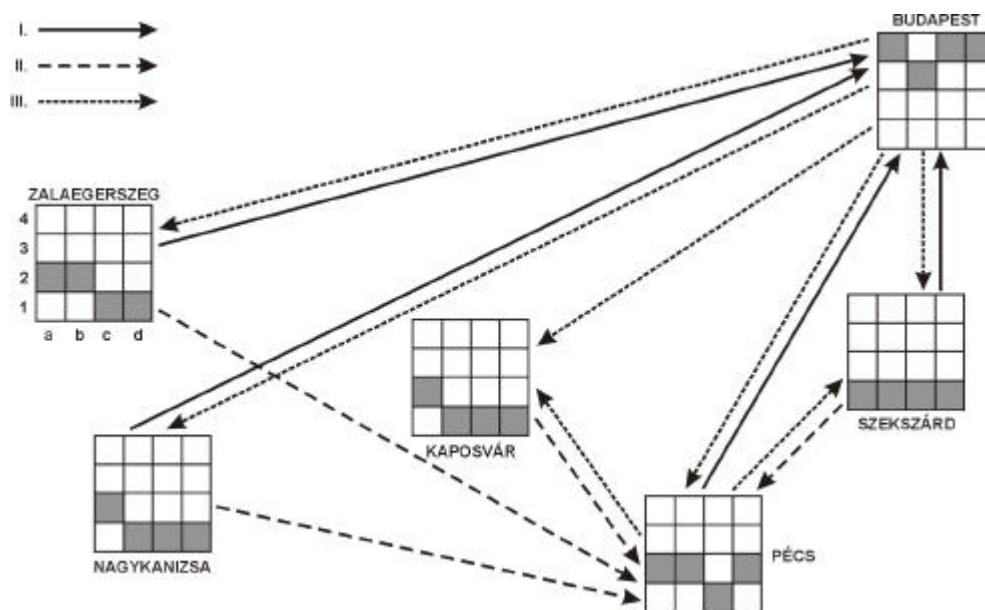
^{b)} Including expenditure on related activities (production, services)

Sources: Research and Development 1999. (KSH-CSO, 1999)

Over the last decade, some improvement has taken place in a few areas. As a result of the strengthening of university and business researches, by 1999 South Transdanubia increased its share from the number of employees to 5.7% and to 3.2% as regards expenditure, however, it is still the one before last in the latter respect) (Figures 3-4).

In 2000 more than 500 innovation-oriented companies (firms with ‘presumably’ innovative profile) were selected according to the database of the Statistical Office and the Chamber of Commerce⁴(*InnoRegió, 2000*). This relatively large number of firms only represents hypothetical and predominantly pure statistical database, which has to be revised in the forthcoming process of the supply side analyses in the framework of RIS. However, the technical level of the produced goods has considerably improved, the supplier connection has strengthened and more and more SMEs have done own R & D activities in the past years. The development of innovation is now among the activities of not only manufacturing firms but also an increasing number of other firms (e.g. services) involved in innovation development. The number of institutions (and organisational units) supporting and organising innovation in the region has increased and so has that of the industrial parks and incubators, and the first innovation centres have been founded. The activity of the bridging organisations has strengthened, although their efficiency varies, their co-operation is occasional and their division of labour is not always adequately co-ordinated. Certain special technology transfer, financing and innovation services (consulting) institutions are still absent in the region (Figure 5).

Figure 5
Draft evaluation of the innovation potential of South Transdanubia



Legend: I. – Diffusion of demand is unrestricted, II. – Diffusion of demand is difficult, III. – Management relations – a – Production structure – production autonomy, b – Industrial and entrepreneurial culture, c – Technical, information network, d – Business services, 1 – Backward, 2 – Less developed, 3 – Good, 4 – Excellent. Source: Constructed by Horváth (1999)

⁴ Out of 500, approximately 200 SMEs regularly apply for MFA (Technical Development Fund) distributed by the chambers and different governmental innovation tenders.

Summarising the situation of innovation in South Transdanubia, the *strengths* and *weaknesses* of the regional innovation potential can be enumerated. Following a series of discussions, consultation and some preliminary surveys over the regional innovation development in the South Transdanubian region, a perspective was generated on the issue of potential *innovation-related strengths* of the region. Among these is the fact that the region has a centre, the city of Pécs with strong cultural, higher education, economic and service, and also innovative traditions, which are important factors in the allocation of critical mass of the institutional and financial resources required by successful innovation programmes. In the coherent development programme of the region the development of innovation is a selected priority, in harmony with the strategic branches of the economic development. The Regional Development Agency has committed itself to the co-ordination of regional innovation development and the elaboration of strategies (RDA is the consortium leader of the EU supported RIS programme).

The region has a good higher education background, ambitious and innovative research staff (2 universities, 5 public research institutes), which is a huge potential for R & D especially in certain segments (biotechnology, environmental research, laser physics). Some commitment has already occurred in the region in order to develop closer ties between firms and research institutes. The region is able to learn, it has a relatively well-trained labour force and a population whose language skills are better than the national average.

On the business side we can see that multinational companies located in the region are typically innovative (Elcoteq, NABI). An expanding segment of SMEs is innovation-oriented and their supply links have appeared. On the supporting institutional side the Pécs–Baranya Chamber of Commerce offers a significant innovation support for entrepreneurs, through their technical assistance, databank, innovation broker trainings and also other services which significantly contribute to the spreading of the conscience of innovation within the region. Recently three innovation and transfer centres have started their operation in the region from Phare resources. The innovation centres, connected to the already existing industrial parks, organise the implementation of R & D, meeting the demands of the economy, and carry out innovation services. In Pécs, a regional Co-operation Research Centre was founded on the university research base in 2000, which, building on the close relation with the Innovation and Technology Development Park, has created a potential research base in the field of laser technology, immune diagnostics and micro-analytics, but environmental protection, the use of alternative energies and electronic developments also receive selected support. The centre considerably strengthens the technical and natural science research and its business relations are underrepresented in the region, but first of all it can evoke the conscious interest of the SMEs in the new technologies.

Regarding the specific economic, institutional and political structures in the region, there are certain factors which have *negative effects* on the developing innovation process. Among these the lack of a comprehensive innovation strategy and the institutional fragmentation is the most decisive, partly because too many organisations deal with innovation, but innovation has no co-ordinating basic institution at regional level (fragmented flow of resources of information). There is no consensus among the institutions with innovation profile of the region and the co-operation among the existing actors are not worked out well, they are individual actions which are often parallel and not effective, the flow of information is occasional.

The links between the industry and the university sector are weak and occasional. The universities do not have innovation strategies and the local institutional–organisational representation of innovation support at the universities is inadequate. The higher education

profile of the region has a relatively weak representation of technical sciences, especially in the fields necessary for the background of technology change (e.g. micro-electronics, informatics, automation) therefore universities need to improve their potential to effectively assist the change of technology.

The co-operative skills of the companies are extremely weak, only few large or medium size business of South Transdanubia has been able to build out a strong network of suppliers and universities, supporting organisations and advisory services play a very modest role in co-operation, too. The majority of the businesses are not innovation-oriented, their market skills are deficient, their market position is weak, and they do not carry out an intensive marketing activity. The other weak link of the innovation process is the limited range of innovation transfer and the related services, the putting of the R & D results into practical implementation. The number of business R & D places is low (less than half a dozen).

All these factors together are significant obstacles of the regional collaboration in the field of innovation development.

3.4 The institutional system and database for network building in South Transdanubia

Within the framework of the Phare project No. HU9606-02-02-59, called “The medium-term development recommendation of the network of Regional Innovation Centres”, the business–institutional database of the region was created (*InnoRegio, 2000*). It contains the list of institutions operating in the region, having a considerable effect on the economy, dealing with regional development, with innovation profile and a general economic development activity. This preliminary supply side survey locates mainly the institutional sources of knowledge creation in the regional economy. From the three segments of the database, the “*Businesses and organisations with innovative profile*” has the broadest range with over 500 items. The size of this group is justified by the fact that this segment contains both the businesses and the private entrepreneurs, making the overwhelming majority, 79% of the circle in question, while the remaining 21% are organisations financed from the budget or non-profit ones. The spatial concentration of the innovative businesses and organisations is demonstrated by the fact that almost half of them (48%) can be found in County Baranya. A large proportion (88%) of these are situated in the regional capital city of Pécs, reflecting the agglomerative potential of the already existing actors. Among the county seats of the region, Pécs – the potential regional innovation centre – obviously stands out with its 42% share of businesses and organisations with innovative profile, followed by Zalaegerszeg (8.6%) and Szekszárd (7%). Surprisingly enough, Kaposvár, a university centre only features a 6.4% proportion, putting it to the last position in the order of the county seats as regards the centres of organisations with innovative profile.

The largest share of this segment contains the businesses with innovative profile (classification No. 7130 in the General Statistical Classification System of Activities) or SMEs winning awards of the Technical Development Fund. Knowledge providers such as universities, research institutes and research groups of university departments, strongly innovation-oriented spin-off and start-up enterprises are the other important elements of it. In this segment there are organisations such as the regional development agency co-ordinating innovation-oriented regional development and micro-regional programmes, foundations pursuing innovative activities, professional organisations (e.g regional office of the Hungarian Society of Innovation, the Innovation Committee of the Chamber Pécs–Baranya Chamber of Commerce and Industry), organisations supporting innovation (Regional Quality Insurance Centre Public Utility Company, Association of Technical and Natural Science Societies),

innovation & technology centres, organisations running fairs and also companies offering technical services and consulting.⁵

Differences in economic performance between the more or less successful regions have prompted a corresponding interest in the mix of regional policies and institutions, which foster this dynamism. A critical component of the innovation system of a region is the R&D institutions, supporting infrastructure and the businesses. The RIS region can be viewed in terms of both demand and supply side of innovation. The supply side, which is considered by this preliminary survey, comes from a series of regional actors and institutions. In defining the supply side, we have restricted it to public and semi-public support services, as these are relatively dominant in the Hungarian context, although this should not denigrate from the important contribution made by business association and most importantly from the private sector. Bridging the gap between the supply and the demand side there is a wide range of innovation support organisations, which play a role in the acquisition and diffusion of technology throughout the innovation system. The RIS strategy for South Transdanubia under implementation has to carry out more precise surveys (supply, needs and trends analyses) and has to focus on the measures to strengthen the role of these organisations and improve the networking linkages between the demand and the supply sides of the RIS.

4. The recommended phases of network building in South Transdanubia

Network development is seen as fundamental to modern forms of regional economic growth and innovation development, which facilitate inter-organisational learning linkages (*Asheim, 1996, Cooke & Morgan, 1998*). These include networks through which firms interact in a generally co-operative way, and networks, which attempt to unite public policy and business interests around a long-term shared agenda. In this chapter I try to summarise the factors on which the network building should be based in the region of South Transdanubia. The network building should be one of the key processes of the RIS implementation, identifying the need of involvement of a range of actors in the regional innovation system. If the formerly independently operating economic units, professional and knowledge production organisations establish connections with each other, they will be able to reinforce each other and the market position of the region, strengthen their innovation potential and improve the competitiveness of their products and services. The stable networks of the regional economy guarantee the safety of income generation, and the resources of the region are utilised in a way that the significant part of the incomes remain in the region. Improvement of the income

5 On the basis of a questionnaire survey carried out by the CRS of HAS in 1999, the locally based innovation institutions and the national ones were mapped, their sphere of activity was analysed and the possibilities of their integration into the network building was examined. We made six functional categories of the institution with innovative profile that can be potentially involved in network building.

1. Institutions pursuing applied researches (including 2 universities and 5 research institutes)
2. Organisations of technology transfer (we found only project-level co-operation implemented by transfer institutes and innovation brokers outside the region.)
3. Technology parks, industrial parks, incubators (14 industrial parks, 3 innovation & technology development centres)
4. Bridging organisations, professional, co-ordinating, innovation service firms (regional office of the Hungarian Innovation Society, three chambers of commerce, Innovation Committee of the Pécs–Baranya Chamber of Commerce and Industry, Business Development Centre, Association of Technical and Natural Science Societies, Regional Office of Hungarian National Technical Information Library, technical advisory)
5. Institutions financing innovation, technology transfer (Regional Development Company, Financial and Services)
6. Training Institutions (Regional Labour Force Development and Training Centre)

generating ability in the region and the increase of the export capacities cannot take place without the construction of the *regional innovation networks*. The network building process in south Transdanubia, adapting the European experiences, should be based on the following phases:

1. The integration of innovative businesses into network building (the encouragement of SMEs to pursue innovative activities);
2. The strengthening of the network links between the universities and industry and the working out of the form of operation for an entrepreneurial and research university;
3. Development of innovation support infrastructure and public-private partnership between regional actors;
4. Implementation of the regional innovation strategy: creation of new kinds of forums and management structure in order to improve the innovation potential and promote networking in the region.

(1) With regard to inter-firm networking, most of the RIS management in the EU-RIS regions were involved in activities to encourage this, particularly with respect to the best practice or the encouragement of business networks as a part of the wider process to develop a more innovative and co-operative business culture within their regions (*Landabaso, 1997*).

The *junctions* and the most important users of innovation are the innovative companies that basically determine the growth of the economy. Only a small part of the South Transdanubian companies – mostly those with foreign ownership – participate in innovation, and despite the technology and management methods, the innovation efforts and the co-operation with innovation institutions are still not widespread. There is a general reluctance of Hungarian SMEs to become involved in business networks, except where there is a direct economic benefit of networking. Innovation rather an internal process, in which firms primarily rely on their own internal sources (workforce's skills, knowledge base, internal R&D) and on some specific external sources such as marketing and supportive business services. Nevertheless, are co-operative interactions, becoming rather more important. Parallel with the general findings of the ERIS survey the most important are the firm relations to the customers and suppliers in our region, as well (*Figure 6*). Further investigation has to discover what extent these relations go beyond the market transactions and whether they are network types, therefore more durable and more interactive relations. We expect limited evidence on horizontal networking in the case of South Transdanubia. Even in the more developed Hungarian regions the traditional subcontracting inter-firm relation is the more characteristic in frameworks of the supply chains, which link larger and smaller firms in a vertical way⁶. In most ERIS surveys it appears that vertical interactions more frequently stimulate the interregional contacts with the firms' suppliers and customers, in which distance usually does not play a major role in contrast to horizontal linkages in which, because of the transaction costs intraregional network relations are more common (*Koschatzky, 1999*). Horizontal networking between competitors is likely to be the more difficult to achieve. Preference for

⁶ In South Transdanubia most of the companies have relations at least within their counties, but almost two-thirds of them have regional connections, too, in fact, the domestic relations outside the region also reach this proportion. The businesses of the three South Transdanubian counties still have a relatively closed character in the typical case, only a quarter of them have Western European and 8% of them other foreign relations. As regards supplier connections, the highest proportion can be found in industry. The proportion of the supplied direct agricultural goods is 32%, the share of supplied products in wood and furniture industry is also high, at the same time, the supplies in mechanical engineering lag far behind the level of the North Transdanubian region (*3K Consens Office, 1999*).

internal solution, lack of trust and fear of losing economic benefits to competitors are among the main reasons.

Innovative linkages significantly depend on the size of the firms: Large or medium size firms in the Transdanubian regions (e.g. Hauni Machinery Ltd.) have not only higher innovation activity, but they have better preconditions for networking, as well the small firms paradoxically have a greater need for co-operating but at the same time more barriers for networking. In our regional case companies belonging to foreign owned larger corporations, due to their corporate links, are more integrated in the interregional and international networks. For them to build an extensive intraregional supply chain could be the first important step toward the utilisation of regional resources and the advantages of spatial proximity through co-operative linkages. For the SMEs participating in supply chains, access to interregional networks are better via co-operation with firms and research institutions already linked to the outside sources (*Koschatzky, 1999*).

According to the European experiences partly gained from the ERIS research those firms considered to be more innovative and more successful economically that are strongly engaged in co-operative activity. Intra- and interregional networking activity seems to be a supportive factor for innovation success. In our region usually a few large and medium size firms have access to multi-levelled networking activity. Small firms, in particular, can profit from intraregional networking, since for them it is even a better alternative to build intraregional linkages than not to have external innovation linkages at all.

In order to strengthen the SME sector ability in South Transdanubia, the network building should be a central element of the innovation strategy formulation. The development of an innovation network, particularly in a less developed region, requires a certain awareness of need for co-operation as well as trust and a lot of time. The demand-oriented network building within the framework of the RIS strategy should promote public-private partnership and inter-firm co-operation, although it has to focus intensively on the specific needs of the business sector. Entrepreneurs do not invest time and money in the network development unless they do expect clear profits and beneficial linkages.

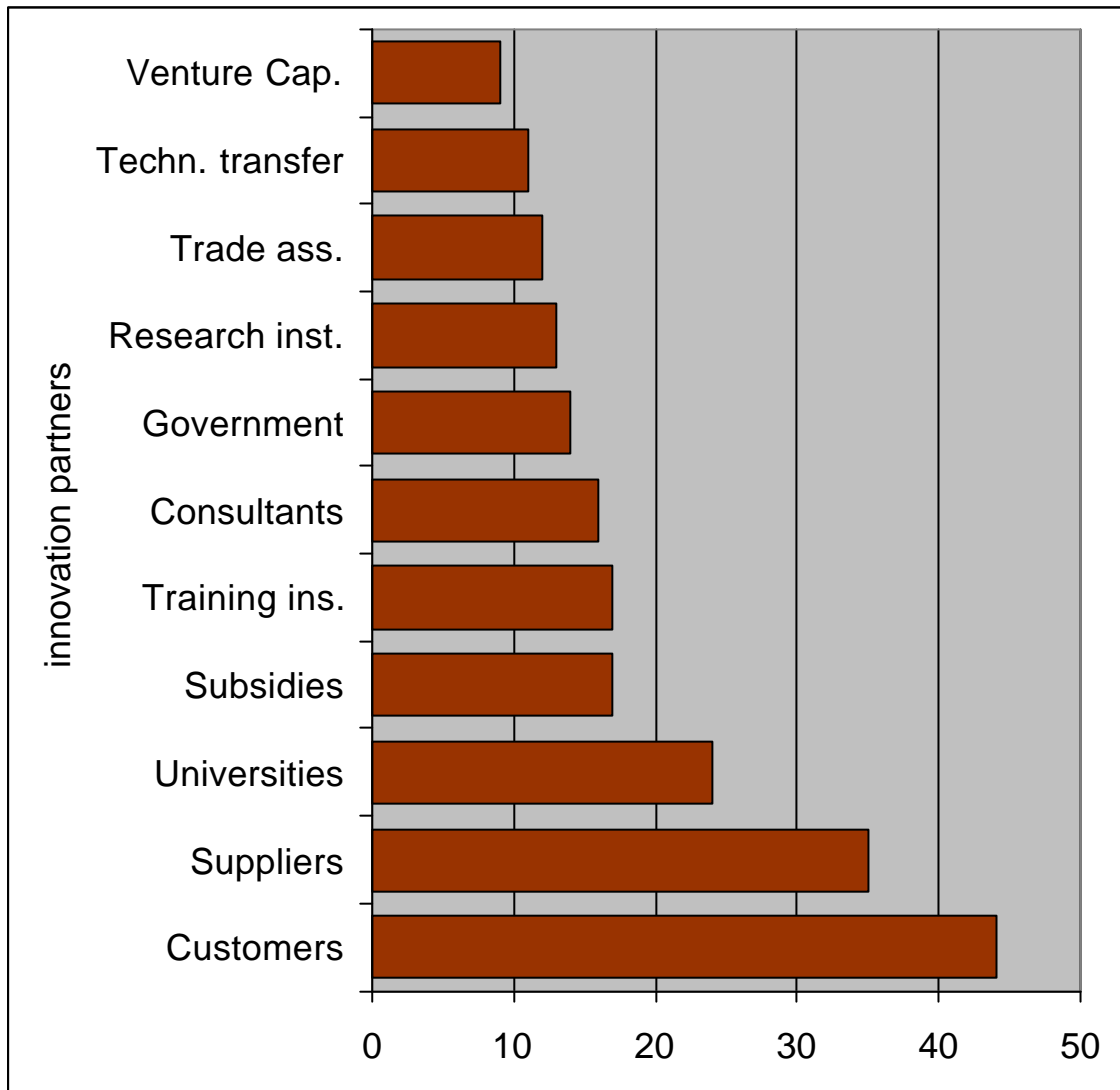
However, the co-operative ability of the small firms, which are considered to be an important economic element in the region, lies in deficits not only in the lack of resources for utilising external knowledge and information but also deficits in the inadequate network management. Thus in the planning of innovation strategy, the need for organisational changes is more and more appreciated. The outdated organisational-management conditions together with the lack of adequate external co-ordinating institutions prevent the companies from the appropriate utilisation of their innovation potentials (*OMFB 1999*).

The prerequisite of the network building is the assessment of the innovation potential of the SMEs sector, the strengths and weaknesses of the businesses, and the identification of the demands and connections of the businesses⁷. Regarding the specific economic structure of our region and the demand of different sectors, the RIS strategy has to bear in mind this regional and particularly the sectoral specificity.

⁷ In South Transdanubia, an innovation potential survey was carried out in last year in order to assess the businesses and identify the needs, intellectual, financial-technical-human and market potential. It also focused on the internal (creativity, resources, market position) and external (connections, environment, market future) factors of the innovation potential of the businesses. By the help of these we can identify those potentially improvable clusters and networks the support of which is desired for the development of the region (Pécs-Baranya Chamber of Commerce and Industry, International Institute of Technology).

Figure 6

Innovation partners of firms; percentage of firms having partners within the REGIS regions



Source: Tödting and Kaufmann (1999)

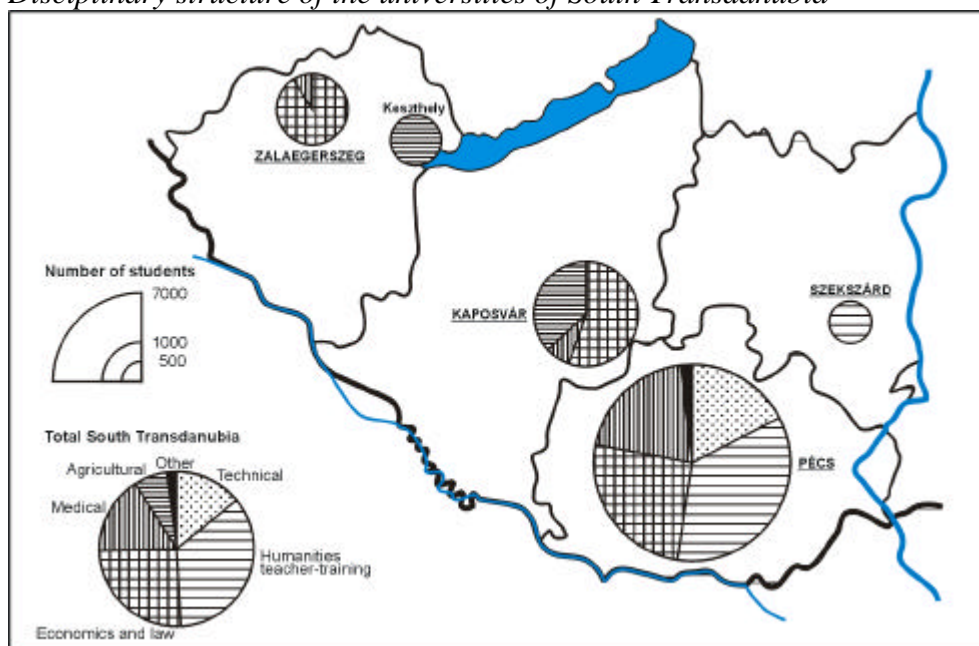
(2) Universities and R&D institutes are, due to their integration into the national and international knowledge pools and scientific networks, potential knowledge source for companies located in their vicinity, however, they are generally less integrated into their respective regions, since they have mainly national and international co-operative partners, and it is also argued that science-led initiatives promoting network building are rarely successful (Koschatzky–Sternberg, 2000). Despite this fact higher education has a potential influence on internal regional development not only because of its place in the R & D sector but also because of its dominant position in the training of experts responsible for the organising and producing, and marketing technologically developed products and competitive services. The biggest potential knowledge creators of the South Transdanubian region might be the universities, despite the recently lower number of innovation related interactions to the business sector. Predominantly medium and large firms have more contact with research institutes, but these contacts located outside the region. The results of the ERIS survey show similar findings, as they imply that the impact of universities on firms' innovation activity is

lower than generally assumed by many of the regional concepts (*Koschatzky & Sternberg, 2000*). ERIS surveys suggest that universities and R&D institutes play less important role as knowledge and information source for firms compared to customers and suppliers. Obviously small firms cooperate to a lesser extent with universities, but if they do so, they mainly interact with universities and research institutes located geographically closer. The short comparison reveals that the spatial co-operation pattern of the research institutes in the less developed accession regions is not an exception from the patterns that can be observed in the other ERIS regions, as the nation and the neighbouring countries dominate in the spectrum of research co-operation (*Koschatzky, 2001*).

As regards the two universities of the region, the business sector relations of the University of Kaposvár, having an excellent reputation in agro-innovation researches, are stronger. The main objective is the deepening of the relations of the University of Pécs to the industrial sector, and the involvement of the SMEs of the region in the utilisation of its knowledge production. Besides the intensive agricultural researches, medical diagnostical and clinical methodological development, laser technology, energy efficiency surveys are carried out, and the research base of informatics and bio- and environmental technology is also strengthening. However, the SMEs of the region rarely turn directly to the universities to get technological information or seeking co-operation. Public and private R&D institutions in the region are more likely to have industry-related co-operations than that of universities. The research activity of the University of Pécs, at the same time, is quite broad, but the competitive natural science or technical researches are weaker compared to the researches of social sciences, or they are less utilised in practice, for the business sector; the proportion of contracts coming from the private sector was only about 4-5% in 1997 (Figure 7, *Pap 2000*). However, the spin-offs from the universities are considerable. The more significant ones are the businesses involved in molecular biology and construction engineering, but most of these deal with service activities. Among the internal obstacles, we have to mention the lack of university R & D strategy, which could define the research priorities; also, there is no organisation responsible for the basic researches of the university, the research infrastructure (instruments) is deficient, but the provision of informatics equipment is not always competitive in comparison with the big western research universities, either.

Figure 7

Disciplinary structure of the universities of South Transdanubia



On the other hand, universities act according to their own rules, which are difficult to adjust to the goals of the business actors. Universities and firms follow their own different logic express their cultural and structural obstacles, making interaction often difficult. Universities still have a stronger focus on teaching and basic research than on applicable research for business purpose, which is a general barrier for knowledge transfer. Those universities which have more industrial links are more interested in large research projects than in helping SMEs.⁸

To overcome these barriers, both governmental and regional innovation policy should create incentives stimulating knowledge and technology transfer and implement measures in order to increase the absorptive capacity and capability for network management of smaller companies and universities. Such a policy approach must be regionally oriented, since it requires trust between the partners and has to respect the preference of small firms for intraregional co-operation.

There are many good examples of European incentive programmes, which in harmony with the local conditions, may have stimulating effects on the co-operation between SMEs and universities in South Transdanubia, in a region with less developed intraregional linkages (*Koschätzky & Sternberg, 2000; Vickers and North, 2000; Koschätzky, 2001*):

- Carrying out a university-wide audit of the knowledge resources which can be made accessible to local business support; The working out of the R & D and the “research university” strategy of the university and strengthening the role of the research units (Co-operation Research Centre at the University of Pécs) which are responsible for university-industry relations; Building out of the *regional university* functions at Pécs;
- Formation of liaison (transfer) office at the university in order to build out of the technology transfer connections between the SMEs and the university research, and appointment of innovation brokers in order to help put SMEs in touch with the most appropriate university departments or researchers for their need. Providing information on technological developments and way of problem solving within the firm itself;
- Stimulation of spin-off activities at universities and the exchange of tacit knowledge are the best-applied recommendations of strengthening the dynamics of innovation networks;
- Information about the potential co-operation partners and promotion measures for co-operation support; Consultancy for firms before entering networks;
- Trying to advance beyond the one-way, technology transfer concept by encouraging universities to see networking as a two-way flow which they can benefit from, as a result of entering into problem areas about which they may have little previous experience;

A general consensus exists in innovation oriented regional development, in which co-operation in innovation between firms and research institutions largely influence the business success and economic performance of the regions – especially in the transformation economies like in Hungary. Active promotion of company spin-offs out of universities and

⁸ A problem of the point of view of universities is that SMEs may be considered to less prestigious than the large corporate clients, plus large firms are more likely to be seen as a source of a long term financial benefit as their technological level is higher (*Hassink, 1997*).

other research institutions would increase the researchers' receptiveness of the requirements of industry and the industry side also should develop competencies in order to utilise newly accessible knowledge provided by the research network for their innovation projects (*Koschatzky, 2001*). To achieve intensive intraregional industry and university relations, the university should not only rely on its existing external connections but also on the closer co-operation with the regionally based businesses and other institutions of innovative profile.

(3) As we stated above because of their preference for local and regional partners, small firms depend greatly on the supportive quality of their regional environment and the innovation oriented knowledge sources available there. The innovative environment refers to set relationship, normally interactive network forms (inter-firm co-operation, technology transfer, co-operation on R&D, information, production and sales) which exist between the major economic, technological and semi-public actors in a region (customers, universities, research institutes, business services, technology parks, innovation centres, transfer centres, technical services, financial institutions, industrial associations, regional development agencies etc.) and which provide the organisational and institutional bases for the local economic development. Owing to the institutional setting and the specific interactions between firms, local knowledge providers, supporting services, economic associations and policy agents, a common technical and organisational culture may develop in a regional production system which might be based on collective learning, human contacts and informal channels of information (*Landabaso, 1997*). According to the literature, we can distinguish network model with respect to the main actors and driving forces. These are the networks of firms (firm-based system), universities and research units (science-based system) as well as policy actors (policy-based system)⁹.

The objective of the network co-operation of partners interested in innovation is the promotion of the economic application of the R & D results generated in the region or available for the region from external sources, by the strengthening of the collaboration among the contributors of the innovation transfer process. This requires the more active participation of the institutional sector (public sector) and the more effective and conscious co-operation with the private sector. According to the findings provided by the ERIS project, it can be stated that besides relevant interactions with consultants, universities and research organisations, other interactions with technology transfer and other support organisations were used slightly by companies¹⁰. It seems as if intermediaries, even if they are useful interfaces, are not explicitly recognised by the firms as organisations providing valuable contributions (*Koschatzky 1999; Tödting & Kaufmann, 2000*).

In the South Transdanubian region, the weakest element of the innovation process is the technology transfer. There is no chance for a self-development on market basis in this field, which makes the professional and financial participation of the public sector necessary, despite the fact that certain elements of the knowledge transfer (e.g. technical design, financial consulting) can be realised in the business services sector, if necessary, by the import of professional skills. The number of institutions and organisational units supporting and organising innovation in the region has increased over the last decade, there has also been a significant growth in the number of business parks and incubators, and the first innovation

⁹ There are regional differences in network types: for instance the Styria and Tampere regions are mostly based on universities or research institutes, while the Basque Country and Wales are rather more on technology centres or regional agencies (policy-based innovation system) (*Tödting & Kaufmann, 2000*).

¹⁰ Technical services among more innovative firms are selected as cooperation partners, while advisory services, on the other hand, affect innovation in industry only slightly.

centres have been founded. At the same time, certain technology transfer, financing and special advisory and technical services (consulting, innovation brokers) are still missing from the region. The expectations of the businesses to the existing institutions, and the initiating (pro-active) way of operation do not only require the establishment of the representatives of new institutions in the missing segments (venture capital company, technological consulting), but also the transformation of the existing institutions, the strengthening of their partnerships.

European examples highlight the significant role of innovation centres (technology parks) in the development of the less favoured regions (LFRs), as they promote regional innovation networks based on the development of synergies derived from the co-operation between R&D units and firms in each other is spatial proximity. The major role of these instruments is the promotion of the new technology-based starts ups, attraction of financial sources (venture capital) and the promotion of dissemination of technological development (modernisation) (Segal & Quince, 1994). Therefore the organising and co-ordinating function of the newly established *regional innovation centre of Pécs* is especially important. It can act as a filter selecting small firms with higher innovation propensity and spatially concentrating them in an area where synergies through inter-firm co-operations and public-private partnerships are more likely to grow. The centre itself hosts a university-related research and transfer centre, by the establishment of technical, innovation and consulting services. The centre can also act as an interface between demand and supply for technology in the region (Gál, 2000b).

This organising, co-ordinating and supportive function of several organisations within the regional environment could be a part of the RIS strategy, which should also include measures for co-operations promotion between firms and institutions of technological infrastructure (consulting, technology transfer, innovation management, advisory services). It is argued that such networks linking diverse type organisations are more important in the most successful regions than the presence of regional development authorities. On the other hand, in the less advanced regions regional development agencies play more significant role in catalysing activities of key actors and in building of ‘associationalism’ and strategies in innovation field.

(4) Most of the European surveys concluded that innovation promotion both by the private and public sectors in the less developed regions, particularly in the accession countries has been inadequate to meet their economic development demand and poor in terms of the adaptation to the specific regional needs and conditions, which helps to increase the technology and development gaps between the regions. For the less developed regions the practical way to handle this problem is to encourage regions to develop regional innovation strategies which aim at promoting public-private partnership, to initiate co-operative linkages between the regional actors and to create institutional conditions for the more efficient use of public-private resources. Regional innovation strategy improves the efficiency of the regional institutional and the support system, joins the regional actors to cooperate for the economic success of the region, implements the innovation policy and creates the forums gathering the actors interested in innovation. The framework of the regional network building and the structure of the concrete organisational forms of co-operation are provided by the European Commission initiated Regional Innovation Strategies (RIS) programmes.

The region of South Transdanubia has won its RIS application, in co-operation with the British Yorkshire and Humber and the Irish Shannon region, handed to “The Regional Innovation Strategies for the Newly Associated Countries” programme initiated by the EU Commission’s 5th R & D Framework Programme in 2001. The process of preparing the strategy means that new type of co-operation forms can be integrated into the institutional framework encouraging contacts and the search for partners, clarifying strategy priorities and

the business-led elements of the RIS. For the economy of the region, only the implementation of the RIS strategy harmonising with the development priorities of the region can result in the abolishment of the former disadvantageous dependencies in the field of innovation (Gál, 2000).

The RIS has to concentrate on the following actions during its phases:

- Identifying and expressing the innovation-related demands of the regional firms, and analysing the major technological and industrial trends influencing the regional economy;
- Identifying the regional innovation resources by the means of supply analyses in order to make policy decisions regarding the creation of new type of organisations;
- Promotion of co-operation between businesses, research institutes and the public sector on the basis of the strategic and sectoral priorities in order to assess technology requirements, audit local demand-supply and improve the innovative capacity in the region;
- Makes public resources available to firms in order to encourage their participation in RIS;
- Set of a demand driven, bottom-up innovation strategy in which sectoral priorities, tasks, project plans, and monitoring system are clarified.

One of the main objectives of the RIS is to raise the regional economy to secure competitive advantages through the diversification of the regional production base and permanent adjustment to the global technical changes. It is necessary to ensure that the RIS has a strong demand driven approach with a strong emphasis on businesses and particularly on SMEs. The key element of the strategy is that it is business-led and that its primary customers are the businesses of the region. The task of our strategy is to identify (and ask business to confirm) those sectors with the greatest potential growth through innovation in order to improve their competitiveness by more effective application of existing public sector support fund and by leveraging in more private sector funds to complement the proposed activity (*RIS-ST Application, 2000*)

The primary task of the RIS is the creation of the appropriate institutional and organisational conditions which develop more efficient policies and actions for the promotion of regional innovation. The management of the RIS integrates all the regional partners involved in research and technical development, innovation and the connected support activities in one project organisation that prepares the strategy and the action plans, as well as the detailed projects and programmes to be launched in the short and medium run. In the South Transdanubian region, where the independent organisational and management system of innovation has not been established yet, the organisation of the RIS joins the institutional system of regional development. The Regional Development Agency as the main co-ordinator of the RIS, participates in the implementation and management of the project.

Within the RIS management, a *regional forum* involving the broader circle of actors interested in regional innovation and also, a *Steering Committee* (SC) has to be established, which is responsible for the control of the project, the approval of the plans, external relations and the supervision of the work programmes and sectoral working groups¹¹. At least, half of the SC members should be delegated by the business sector, but the representatives of the

¹¹ The operative, daily work of the RIS programmes is done by the so-called *Management Group*, which is responsible for the practical co-ordination of the individual sectoral projects, for keeping in touch with the separate working groups and the implementation of the different meetings, workshops, interviews and media connections. International and national experts of innovation and regional issues will assist the RIS.

universities, regional development, public administration, regional research, the chambers, the local governments, the technology centres and the regional development council will also be involved. It is very important to make sure that the members of the SC are people with a good reputation in the region, are accepted by all the participants without reservations, because this is the only way to ensure that the Committee can give the project an adequate weight and credit. Especially the industrially-oriented RIS Director should have good relations either both with the business sector or the public administration. The director could be appointed to assist to remove co-operation barriers, to convince firms of the need for innovation and network management. His moderation role is part of the regional innovation strategy, which also includes measures stimulating public/private and inter-firm network-type co-operation and integrate other industrial, technological and regional measures.

5 Conclusion and RIS project outlook

The new spatial models of innovation and the regional dimension of innovation network building are topical tasks both for academic and applied researches. There is a strong consensus among regional policy makers that the number and the quality of the innovation networks within the wider framework of the regional innovation strategies can be increased with the help of the regional policy measures (*Koschatzky-Sternberg, 2000*). This argument is supported by the fact that – most of the regions with strong innovation networks have – very influential and active political actors and regional development institutions (e.g. agencies). These actors with their conscious policy measures can successfully compensate to some extent the lack of certain internal resources necessary for innovation development in the less favoured areas. Especially in such peripheral regions as South Transdanubia a more basic policy approach is necessary which aims at the formulation of the regional innovation strategy and the actors should build cooperative linkages. The EU-promoted RIS programmes are supporting the network approach bringing together regional actors in order to raise regional awareness in regional innovation actions and create a business-oriented, publicly supported environment for the full exploitation of regional innovation potential. The major aim of the RIS strategy for the less developed regions of the accession countries is a demand-driven network building initiated and promoted by strong public (state) programmes and aiming at the appointment of industrially-oriented moderators. As *Landabaso (1997)* argued, without establishing the new forms of co-operation among regional innovation players, especially between the business and scientific sphere, and utilisation of regional skills and political capital in order to promote innovation-driven economic development, it will be impossible to reduce the technology gap among different nations and within certain countries.

For the working out of the RIS for South Transdanubia, actions and network building, it is indispensable to achieve a consensus among the regional players and to awake the consciousness of the regional actors about the objectives and expected benefits of the strategy- and network building. Rapid results and strategy building can only be expected from the organisation of a *regional development coalition* and from the active participation of the committed politicians in the whole process. The aim is to formulate a flexible but still powerful negotiation mechanism that is suitable for the effective promotion of the bottom-up building regional consensus. During the 32 months long RIS making process, which is a short term, we can not expect spectacular, economically measurable impacts but common thinking, awareness raising through the various forms of communications (RIS conference, homepage,

newsletter, sectoral working groups etc.) of the programme will be one of the most important key activities. We would like to make a stress on the strong interpersonal communication forms, considering innovation itself as a communication-practice, in order to express more precisely the aims of networking. We chose this way partly because our foreign partners' experiences proved more successful the use of face-to-face communication than raising the attention of the mass media in which they have not been successful. The process of the strategy preparation means that new type of co-operation forms can be integrated into the institutional framework encouraging contacts and the search for partners, clarifying strategic priorities and the business-led elements of the RIS. The management team agreed that RIS has to build on the already existing institutions, involving them into the strategy making process rather than creating new organisations, which might cause the segmentation of the given institutional base.

The other important element the RIS management is facing is the extent of involvement of both the entrepreneurs and the universities into the RIS process. It is necessary to ensure that the RIS should be a demand driven approach with a strong emphasis on businesses and particularly on SMEs. The key element of the strategy is that it is business-led and it has to focus intensively on the specific needs of the business sector. However, there is a general reluctance of the Hungarian SMEs to become involved in business networks and entrepreneurs do not invest time and money in the network development, unless they do expect direct economic profits and beneficial linkages of networking. Therefore we think that the business sector has to be involved in the RIS process only in a later stage when these beneficial linkages through concrete actions are insured and the public sector is well prepared to collaborate within the economic field.

Regarding the role of the universities in the innovation process, our foreign partners express their sceptical views that fit into our previous argument that universities are the most difficult to adjust to the goals of the business sector. Universities follow their own different structural and cultural logic, making their business co-operation difficult. Another negative perception is that universities often attempt to gain control over the projects in co-operation with firms. Easing university–industry collaboration, firms should not co-operate with the university as a whole but directly with the research teams instead. According to the more business-oriented view of the RIS in Yorkshire & Humber region, it is more useful for the businesses to buy technology from outside the region rather than invest into local R & D facilities. This is supported by the argument which states that there is a little scope for regionally-specific technology development, since R & D activities are embedded in national, supranational and global science, and regional innovation systems cannot be isolated from these levels and direct access to the international knowledge networks are available (*RIS for the Yorkshire and Humber Region, Report, 1998*).

The major objective of our RIS is that the finalised document has to reflect the ideas of the people of South Transdanubia, presenting a real picture of the conditions of innovation within the region, and operational projects based on the elaborated strategy have to serve efficiently the operation of the regional economy. The purpose of the programme is ambitious as it intends to change fundamentally the people's notion and the attitude to innovation. Therefore, we regard the regional innovation strategy as a "social development exercise" as well. The main task of it is the creation of the appropriate environmental and institutional conditions for the effective technology transfer and the increase of the innovative capacities of the regional economies, which ultimately creates a regional competitive advantage, a sustainable

economic development, stable jobs and higher living standards for the region of South Transdanubia.

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