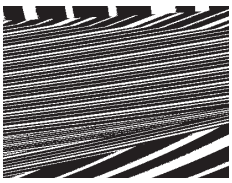

KNOWLEDGE TRANSFER, INSTITUTIONS, AND INNOVATION IN CROATIA AND SLOVENIA

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The paper investigates the institutional framework to support knowledge transfer in Slovenia and Croatia. In transition economies knowledge transfer is subject to several sources of market failure which provides a justification for government intervention. The success of these policies also depends upon the ability of academic institutions and the business sector to collaborate in technology networks, innovation clusters and the mobility of researchers between the two sectors. The paper first surveys the innovation capacity of the two countries and concludes that although the overall level of innovative activity is above that of the new EU member states, it is highly skewed in both countries towards the public sector in research institutes and universities. The paper goes to review the knowledge transfer policies, institutional framework, and policy outcomes in the two countries. The paper concludes, firstly, that policies to support technology parks and business incubators have failed to generate much spin-off activity in either country. Secondly, Slovenia has been relatively more successful in its policies to develop technology networks, innovation clusters than similar policies in Croatia. This suggests that the gradual development of social capital and trust between the actors within clusters and networks is an important factor in overcoming the market failures associated with knowledge transfer.

Key words: knowledge transfer, innovation, networks, clusters, market failure

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INSTITUTIONS, INNOVATION AND KNOWLEDGE TRANSFER

Conventional economic theory suggests that knowledge transfer would take place spontaneously in a market economy as knowledge and technologies are traded in competitive markets. Baumol (2002) has argued that in developed market economies the force of competition between large oligopolistic firms can propel a technological 'arms race' between the largest firms in an industry that drives technological progress. Oligopolies sometimes enter into voluntary knowledge sharing agreements in technology consortia in order to share technological know-how to develop new technologies on a collaborative basis. In this view there is little need for government intervention to encourage knowledge transfers and to promote innovation. The market can be left to its own devices and competition will drive both innovation and the dissemination of new technologies.

Yet as Arrow (1971) long ago pointed out, information and knowledge are not always so easily amenable to market exchange, and market failures abound. Firstly information is indivisible and the cost of dissemination is typically very low so that the inventor cannot easily capture the economic value of new knowledge. Another serious source of market failure is the lack of appropriability of information and knowledge. A well developed legal system capable of enforcing intellectual property rights is needed to overcome this potential source of market failure. Yet even where the legal system is well developed problems may persist. As Arrow pointed out "…no amount of legal protection can make a thoroughly appropriable commodity of something so intangible as information. The very use of information in any productive way is bound to reveal it, at least in part" (Arrow, 1971, 148). Information is also subject to market failure because investment in the production of knowledge and its acquisition is a risky activity, since an investor cannot be certain of the value of the information until it is used. For all these reasons businesses may under-invest in information and knowledge transfer, and in consequence the level of innovation and competitiveness in a market economy may be less than potentially achievable.

Moreover, recent research on social capital has suggested that the ability to transfer knowledge, even on an apparently well functioning market with adequate legal protections, may also depend upon elusive factors such as trust between the parties to the exchange (Field, 2003). As Field has noted "knowledge is a notoriously fragile commodity, in that sellers have little protection from unscrupulous behaviour by buyers, other than the high cost of legal action; knowledge therefore tends to be exchanged far less freely than is optimal for busi-

ness performance. Trust-based relations between entrepreneurs may help compensate against these risks, and can reduce a variety of transaction costs" (Field, 2003, 54). However, trust is built only slowly over time. It may be encouraged by the repeated exchange of ideas and personnel between the research institutions and the industry sector, in both directions. This requires flexible institutional arrangements.

Recent research into national and regional innovation systems (Brazcyk et al., 2000) has shown that differences in innovative capacities between countries and regions are linked to the institutions which promote learning and technology transfer activities. These in turn depend upon the existence of networks of institutions and firms that permit reciprocal exchange of knowledge and information (Morgan, 1997; Audretsch, 2005). Such reciprocal exchanges are facilitated where the institutional structure is flexible enough to permit interaction between research institutes, university science departments and industrial enterprises.

These arguments are especially relevant in the case of transition economies, where the legal system may not fully protect intellectual property rights, and where old relations of trust have broken down as research teams have been dispersed and disrupted, where foreign direct investment is low, and where large domestic enterprises may be protected from the force of oligopolistic market competition. In these circumstances it is likely that there will be low levels of knowledge transfer both between businesses and between research institutes and business entities. This suggests a role for government intervention to stimulate the application of inventions and provide a boost to the level of innovation activity.

In this paper we analyse the role of government intervention in the support of innovation and knowledge transfer in Croatia and Slovenia.[1] Both countries have experienced economic and social disruption and the process of economic transition. While Slovenia has entered the EU and has established itself as the most advanced of the new member states, Croatia has not yet achieved its goal of EU membership and has suffered from the persistent problem of low levels of economic competitiveness which has undermined its economic development potential. In the next section we review the innovation capacity of the Croatian and Slovenian economies. In the third section we review the main strategic directions of research and technology policy. The fourth section identifies the institutions which have been established to facilitate knowledge transfer and innovation and the outcomes of the policies that have been adopted in the two countries. At the end we draw some conclusions concerning the effectiveness

of these policies and the role of institutions in promoting knowledge transfer and innovation.

INNOVATION CAPACITY IN CROATIA AND SLOVENIA

Under the socialist system in former Yugoslavia, both Croatia and Slovenia had a strong research capacity within the large enterprise sector. Following the break-up of Yugoslavia many large companies collapsed and their research teams were dispersed. However, both countries succeeded in preserving science capacity in public research institutes and universities and managed to maintain a greater research capability than most other transition states of Eastern Europe.

Slovenia has a relatively high rate of public investment in R&D equal to the EU average of around 2% of GDP (CEC, 2004a). In Croatia, total expenditure on R&D over the last five years has been far lower, at just above 1% of the GDP (1.14% in 2003[2]). However, although the total level of expenditures on R&D in Croatia is much lower than in Slovenia and the EU-15, it is above the average of the new EU member states.

In both Slovenia and Croatia, R&D expenditure by the private sector is relatively low compared to the EU-15 countries (CEC, 2004a). In Croatia for example, the private sector spends just 0.45% of GDP on R&D compared to 1.30% of EU--15.[3] The private sector employs relatively few researchers in both countries. In 2001 only 26% of Slovenian researchers were employed in R&D units in the private sector (MoE, 2003, 127). In Croatia the private sector share in total R&D employment is even lower than in Slovenia, at about 19%,[4] compared to the 56% in the EU-15. Among the new EU members (EU-10) only Bulgaria has a lower share of researchers employed in the private sector than Croatia.

A large part of the public science research sector in Slovenia is based in 56 public state-owned public research institutes which employ more than 3,000 R&D personnel who are in effect civil servants. The two largest research institutes are the Chemical Institute and the Jozef Stefan Institute (covering natural and technical sciences, technology and engineering), both located in Ljubljana. The two large universities at Ljubljana and Maribor host a further 39 research institutes, laboratories and clinics which are however far smaller than the established Research Institutes.[5] Critics argue that the disconnection between research and industry is reinforced by the separation of the research institutes and the universities. The Croatian research system consists of 6 universities, 26 public research institutes, 11 research centres in the industry sector, 18 schools of professional higher education, 8 polytechnics, 1 military research centre and about 50 other scientific research legal entities.[6]

Links between academia and industry are rather weak in Slovenia compared to Western European countries (Bučar and Stare, 2001). Domestic commentators frequently point out the gap between the relatively well-developed public research sector and the needs of the business community (Bučar, 2004). According to a recent report "universities are still primarily teaching rather than research institutions. What matters for career progress are publications and citations rather than practical applicability of research accomplishments" (Rebernik et al., 2002). A recent government study agreed that there is too much emphasis on academic research driven by a promotion-seeking race for publications in academic journals at the expense of applied technology development in industry (MoE, 2003). It is generally considered that knowledge transfer from universities to SMEs is underdeveloped in Slovenia. According to a recent European Commission report "there is insufficient co-operation between business and universities and other public research institutions" (CEC, 2004a, 2).

The same could be noted in Croatia, which has a below-average rate of knowledge transfer from its universities and research centres to its private enterprise sector, although the position has improved in recent years.[7] Compared to the main EU competitors, Croatia's position is rather weak and links between academia and industry are inadequate measured by access to research, subsidies for acquisition of new technology, and support for engineers and scientists for commercialisation of their ideas (Singer and Lauc, 2004). According to a recent Competitiveness Report, Croatia needs to develop a more ambitious innovation policy to encourage knowledge transfer towards technologically dynamic enterprises. EU accession may eventually promote the expansion of the knowledge base, by stimulating R&D activities. The cooperation of Croatian companies with EU partners could result in a significant transfer of new technologies.

Innovation among SME's

Innovation surveys carried out by the Slovenian Statistical Office provide information on the innovative activity in SMEs in the manufacturing sector. The 2004 survey shows that 21% of enterprises are innovation active and had introduced new or improved products or processes (SORS, 2004). However, SMEs are not as innovative as large companies. Whereas over half of surveyed large firms (55%) were innovative, only 28% of medium sized firms and 13% of small firms had undertaken innovative activity. Innovation active enterprises were asked about their main sources of information. Only 5.2% of innovation active firms report that they consider universities to be highly important sources of information. Medium sized firms appear to gain most from information from universities: 7.9%

of them reported that universities were a highly important source of information, compared to 4.1% of small firms and just 2.6% of large firms. Research Institutes were an even less important source of information. Only 4.6% of firms overall cited them as highly important information sources. Medium sized firms hold a more favourable view than large firms: 6.2% cited Research Institutes as highly important sources of information compared to 4.7% of small firms and just 1.9% of large firms.

As for Croatia, the first statistical survey on innovation activities in the enterprise sector was conducted in 2004 by the Institute of Economics, Zagreb on a sample of 3,749 Croatian enterprises, out of which 567 enterprises provided the requested data. The survey measured the frequencies and intensity of innovation activities, as well as the sources and obstacles to them. It was conducted on the basis of the standard EUROSTAT methodology of Community Innovation Survey (CIS3).[8] The survey[9] revealed that about 54% of production enterprises introduced innovations relatively frequently in the 2001-2003 period. As in Slovenia, most innovations in Croatia are made in larger companies rather than small companies and there is a much higher share of innovating firms among firms with more than 250 employees (Račić, Radas and Rajh, 2005). The survey revealed that Croatian enterprises give very low importance to universities and research institutes as a potential source of information, which, as in the Slovenian survey, indicates rather low levels of cooperation, and of knowledge transfer between research and business sectors (Račić, Radas and Rajh, 2005). The survey also revealed that insufficient support from the state is perceived as the least important obstacle to innovate, implying that the state plays an important role in the innovation process in Croatia.

A recent survey carried out by the European Commission[10] in 2005 measured the capacity for innovation in EU members and four South East Europe countries (Bulgaria, Romania, Turkey and Croatia). Slovenia scored among the group of highest innovation enthusiasts. While Croatia scored an above-average capacity for the innovation of new services and products (40% compared to the average 39% of the sample) Croatia's position is comparatively weaker than that of Slovenia.

KNOWLEDGE TRANSFER POLICIES

Slovenia

In Slovenia in 2000 the Ministry of Economy's Department for Entrepreneurship and Competitiveness introduced the "Programme of Measures to Promote Entrepreneurship and Competitiveness 2002-2006" focused on the stimulation of innova-

tion, and investments in knowledge and technological development. The policy provided state support for the creation of incubators at universities, the development of technology parks and technology networks, and joint research projects by enterprises and scientific research institutions. It also provided support for the development of industrial clusters envisaged as networks of enterprises, universities and research institutions.

The first sub-programme, "Knowledge for Development" aimed to improve the flow of knowledge from educational and research institutions to the business sector. It included a measure to promote the entry of young researchers from the universities into industry, and a measure to promote the establishment of business incubators within universities and research institutions. A third measure provided co-financing to enterprises for the costs of equipment provided to research institutes for R&D projects. Its aim was to promote cooperation between "knowledge institutions" and enterprises to improve the utilisation of research and development capacity, and to speed up the commercialisation of knowledge. The second sub-programme on "Improving Enterprises' Competitive Capacity" supported the creation of industrial clusters and technology centres involving companies and research institutes, and the creation and development of technology networks to develop new technologies and to widen access to existing technologies. The third sub-programme on "Promoting Entrepreneurship" had a number of measures specifically geared towards promoting knowledge transfer to SMEs. One specific measure provided financial incentives for SMEs in incubators and technology parks. Another measure was designed to promote the creation and growth of innovative enterprises through subsidised loans, investment guarantees and direct credits.

The National Science and Technology Council is the leading policy-making body in the field of science and technology. According to the 2002 Law on Research and Development it has six members from the research community and six members from the Ministry of Economy and the business sector. It also has one representative from civil society and one representative of the researchers' union. Its chairman is the Prime Minister. Following widespread consultations, it prepares the "Foundations of the Slovenian Research and Development Programme" which it presents to the Ministry of Education, Science and Technology.

The National Research and Development Programme (NRDP) is drawn up by the Ministry of Education, Science and Technology, on the basis of the recommendations of the Science and Technology Council. The current draft NRDP

specifies that research institutes will be required to demonstrate financial participation by business partners, in new research projects. This should enhance cooperation between research institutes and the business sector.

A new law was introduced in January 2004 on "The Support Environment for Entrepreneurship". It provides further financial support for incubators, technology parks, technology centres and technology transfer offices. The new law will make money available for the pre-start-up phase, which has been lacking up to now. It will provide small grants to academics working at universities to stimulate the development of new ideas. Under the law, a Slovenian Venture Capital Fund will be created within the Slovene Enterprise Fund, which is responsible for the provision of subsidised loans to SMEs. The venture capital fund will be established on the basis of public and private co-funding. It will aim to support new innovative enterprises and SMEs. It is expected that the law will be implemented during 2005.

A National Agency for Technology Development was established in February 2004 under the R&D law. The aim of the Agency is to offer financial support to development programmes of companies and especially their cooperation with science institutions in Slovenia in projects that would result in the transfer of knowledge. (An Agency for Scientific Research had already been established in November 2003.) The European Regional Development Fund has been opened for Slovenia as a new member state of the EU which is able to provide funding for technology parks and new services and infrastructure to support R&D activities.

A new coalition government was elected in 2004. It again reorganised the ministries and created a new Ministry of Higher Education, Science and Technology. There was some concern among Slovenian policy experts that the old problems would re-emerge under this new structure, and that the recently introduced measures may not be implemented. However, the draft Slovenian Strategy for Development 2006-2013 launched by the government in July 2004 emphasises the importance of innovation and of supporting applied research.

Croatia

In Croatia the national research and technological policy is the responsibility of the Ministry of Science, Education and Sports. The Government has defined its policy for science and technology development in the "Strategy for Development of Science in the Republic of Croatia in the 21st Century", adopted in 2003. In September 2005 the Ministry of Science, Education and Sports (MSES) adopted another document "Cro-

atian Science and Technology Development Policy" which will serve as the basic framework for future research and technology projects.

In 2004 several activities were started to strengthen the Croatian National Innovation System (NIS) by establishing new institutions and strengthening the capacity of existing ones. The institutional framework was enriched by the establishment of the Croatian Accreditation Agency in 2005 whose activities were previously scattered among different institutions.

In the last five years the Ministry has carried out various activities to assist innovative technology development. In May 2001 the HITRA[11] programme (Croatian Programme of Innovative Technological Development) was started by the Croatian Ministry of Science and Technology, aiming to enhance cooperation between the science and business sector on new technology development. The main mission of HITRA was to enhance the commercialisation of innovations and to transfer knowledge on technological innovation from academic research centres to the enterprise sector. Most of the registered innovations in Croatia have remained within the academic community without testing their commercial possibilities, holding back the technological development of the economy. The HITRA Programme aimed to bridge that gap so as to increase the innovation performance of the Croatian economy.

The Programme was implemented through two technology projects known as TEST and STRIP (for developing early stage simple and complex technological projects) mainly directed to the academic community, and the sub-programme RAZUM directed to enterprises which use new technologies developed in cooperation with Croatian scientific research institutions. In 2005 the TEST and STRIP projects were combined into a single Programme called JEZGRE which aims to enhance R&D resources in industry and to increase the employment of young scientists in industry.

RAZUM was redesigned in early 2005 and re-launched by the Business Innovation Centres Network (BICRO)[12] through three new projects including (a) VenCro, which finances new hi-technology start-ups through a venture capital fund supported by a €31 million World Bank loan[13] approved in 2005, (b) Tech-Pro, which assists established hi-tech firms with funding for the new technology and business infrastructure and which also funds new technology and innovation centres and incubators, and (c) Product Quality Facility (PQF) projects aimed to improve the competitive capacity of existing SMEs in order to increase their access to new technology knowledge and management skills.

Established in 1997, BICRO's mission has been to link innovative business firms with R&D at universities and finan-

cial institutions, offering seed capital and various innovation schemes. BICRO has been responsible for implementing the government's programme for the creation and development of knowledge-based small and medium enterprises, drawing also on regional and local funding. BICRO also relies heavily on regional Technology Innovation Centres whose activities are also supported by government funds. Since 2004 the activities of the BICRO Network have been supported by the Ministry for Economy, Labour and Entrepreneurship (MELE) through the Projects for Innovators. In 2004 MELE launched a special loan programme to provide incentives for SMEs with projects for buying new technology and equipment. About 111 such loans were disbursed, totalling €15.9 million (Singer and Lauc, 2004, 25).

All these programs are limited in size and bureaucratic in their procedures. Moreover, according to the Croatia Enterprise Policy Performance Assessment (OECD, 2005) support programs in Croatia for crafts and SMEs lack adequate tax incentives for investment in advanced technology and knowledge-based production and services, although special tax benefits for R&D expenditures in the private business sector were introduced in December 2003. Such costs are actually deductible twice: first as deductible expenditures when taxable profit is calculated and secondly as a reduction of already calculated taxable base for corporate income tax (CIT). The R&D tax incentives should encourage a considerable increase in research and development in Croatia if the regime is administered in a non-bureaucratic manner.

INSTITUTIONS AND OUTCOMES

Incubators and spin-offs

In recent years universities in many industrialised countries have set up programmes to encourage academics and students to establish spin-off companies to commercialise the results of their scientific inventions. Such companies are typically small high-technology companies. The commercialisation of scientific research through spin-offs is a direct means of transferring knowledge from higher education institutions to the private business sector. Yet the use of spin-offs as a mechanism of knowledge transfer is not without its drawbacks and difficulties. Based on a study of spin-offs from Cambridge University in the UK, Druilhe and Garnsey (2004) argue that policy makers should pay more attention to the diversity of spin--offs since only a small minority will have growth potential and offer a high return to the originating institution. Degroof and Roberts (2004) studied spin-off policies of the eight lar-

gest academic institutions in Belgium and at forty-seven companies which had been spun off from them. They concluded that spin-off policies should be highly selective, and that a high level of support is needed especially in those cases where the entrepreneurial infrastructure and culture are weak. In the absence of adequate support, spin-offs may remain stuck at a small scale of operation.

University based start-ups and spin-offs are high-risk ventures. Typically, spin-offs may find it hard to raise either outside equity capital or loan funds to finance their activities (Lerner, 2004). Equity investors may be reluctant to invest because of information asymmetries between the academic entrepreneur and the investor. Banks may be reluctant to invest because of adverse selection problems (high risk-adjusted interest rates discourage all but the most high-risk borrowers). Because of these risks, investors are likely to be attracted to spin-offs only if they are able to control a majority equity stake leaving only a minority stake to the university. Moreover, the returns from spin-offs may be limited and uncertain. Spin-offs typically lack the managerial expertise they need to develop the capabilities to exploit the commercial potential of their technologies (Wright, Vohora and Lockett, 2004), a difficulty that can however be overcome if spin-off companies form joint ventures with established companies. If research institutions are not allowed to retain the right to patents in inventions that they make, and if they are constrained by restrictive regulations and bureaucracy there is even less chance that their spin-off activities will be successful (Lerner, 2004).

In Slovenia, the government has promoted the creation of business incubators within universities and research institutes to provide infrastructure and consultancy services to new start-ups. Through the "Knowledge for Development Programme" it has co-financed the costs of project preparation and premises, staff and running costs of incubators for spin-offs. Under the specific measures for SMEs – "Promoting Entrepreneurship" – the Ministry of Economy has provided co-financing for 50% of the costs of one-off consultancy services to enterprises in the initial phase of project start-up within an incubator, and for up to 25% of the costs of equipment, land and buildings used for R&D activities of an incubator. Three business incubators have been established in Ljubljana, Maribor, and Koper, supported by the government programme of measures. These incubators support new companies by providing assistance for the development of their business plans and with other early-stage support. Once the business plan has been developed within an incubator the new companies are supposed to transfer to a technology park.

Up to now the officially supported incubators do not seem to have been very successful. In 2003 the Slovenian Enterprise Fund announced a SIT100m competition for subsidised long-term loans for companies spun-off from universities through the incubators, but no applications were received. The officially supported incubator in Maribor which was established by the municipality and located in Maribor Technology Park is rather ineffective, and an unofficial incubator has been established by personnel from the university Faculty of Economics and Business in Maribor called the "Venture Factory".

In Croatia, spin-off companies at universities and research institutes are still a rare phenomenon. One of the latest initiatives to establish spin-off high-technology companies was initiated in 2004 at the Institute Rudjer Boskovic (IRB) as a joint venture with foreign partners. The IRB's Science and Technology Programme (2004-2008), supported by the World Bank, includes four pilot commercialisation initiatives.[14] The spin-off firms will launch commercially viable innovations supported by venture-capital funds. Several new business incubators were established in 2003-2005 as a result of the "Special Funding Programme for Enhancement of Development of Business Incubators" initiated by the former Ministry of Crafts, Small and Medium Entrepreneurship (MCSME) which approved more than HRK 7 million in incentives for the operation of Business Incubators in 2003. The business incubators are often part of other SME support institutions, such as entrepreneurship centres and technology parks. The small business community claims that information on business incubators is not readily available and the services they offer are not sufficiently specialised. According to OECD (2005) there are about twenty business incubators out of which fifteen are fully operational in Croatia, while the latest European Charter for Small Enterprise Annual Report for Croatia puts the number at sixteen (CEC, 2006). Business incubators are also being established as students' initiatives (for instance at the Faculty of Electrotechnics Zagreb). In 2004 the Government adopted a Programme to Encourage the Establishment of Students' Firms and provided funding to promote such initiatives in secondary schools.

The development of business incubators is constrained by the lack of adequately trained and experienced staff. Appropriately qualified incubator managers, combined with adequate financial support, are important factors for the success of such programmes to encourage business incubators. The impact of business incubators is also diminished by the lack of suitable follow-up and absence of plans for tenants vacating

at the end of the contract period. Research is required into the performance and effectiveness of the existing incubators.

Technology Parks

Spin-off companies are often located in science or technology parks based either within or close to a university or research institute. Siegel et al. (2003) argue that the location of a firm in a science and technology park will accelerate the diffusion of new technologies. Lindelöf and Löfsten (2004) argue that proximity between firms and universities in science and technology parks promotes the natural exchange of ideas through both formal and informal networks. Formal methods include licensing of technologies and informal methods include meetings between academic and industrial personnel, and job mobility of scientists and researchers. Some early empirical evidence suggested that the level of interaction between firms in science and technology parks and local universities is generally low (Massey et al., 1992) and that cooperation between firms in a park may also be less than one might expect (Quintas et al., 1992; Johanisson, 1998) which may be due to the heterogeneity of the firms in a Park (Lowengren-Williams, 2000). Nevertheless, interactions between park-based companies may be greater than among other firms (Felsenstein, 1994). Lindelöf and Löfsten carried out an empirical study of 265 NTBF firms in 10 science parks in Sweden, compared with a matched sample of off-park firms. They found stronger links to universities, higher levels of technological innovation, and higher rates of growth in firms located in parks compared to off--park firms.

A technology park is a special form of incubator aimed at enterprises with high technology requirements which facilitates the commercialisation of academic research activities. There are three technology parks in Ljubljana, Maribor and Nova Gorica. The Parks are partly funded by the Ministry of Economy and partly through rents earned from their tenant companies. The basic aim of the Parks is to provide a favourable environment and infrastructure for SMEs which commercialise innovations from research institutes. Under the specific programme of measures for SMEs – "Promoting Entrepreneurship" – of the 2002 "Programme of Measures" the Ministry of Economy provides co-financing for 50% of the costs of one-off consultancy services to enterprises in the initial phase of a project start-up within a technology park, and for up to 25% of the costs of equipment, land and buildings used for R&D activities within a technology park.

The Ljubljana Technology Park supports the creation and growth of new high-technology companies spun out from Slo-

venian universities and research institutes. In addition to the Institute Jozef Stefan it collaborates with the Faculty of Informatics and other institutions in the field of natural sciences. It aims to develop an entrepreneurial spirit among science students and staff, and to encourage them to set up small high-technology companies. Although the collaboration with the science research institutes is strong, the collaboration with the University of Ljubljana is much weaker, partly as a result of the entrenched division between pure science and technology in Slovenia.

The Jozef Stefan Institute established the precursor of the Ljubljana Technology Park in 1992 as a pilot project which had already enabled the creation of nine hi-technology spin-off companies. Three years later, in 1995, the Ljubljana Technology Park Ltd. was founded as a non-profit limited liability company. Its founder owners were the Jozef Stefan Institute which owned 54% of the shares, the Institute of Biology, the Institute of Chemistry, some private companies (IskraTEL, Helios, LEK, SKB Bank), and a state body, the Technology Development Fund. More recently the Municipality of Ljubljana has become a majority owner with 60% of the shares. The Ljubljana Technology Park provides tenants with professional educational courses, organises participation of tenant companies in international trade fairs and provides consultations on development strategies, financing, participation in foreign markets and placement of products.

By 2004, the Ljubljana Technology Park hosted 55 active companies of which 44 were new start-ups, and of these 34 were spin-off companies from universities and the research institutes. Spin-off companies have been established in the fields of information systems, energetics, automation, biotechnology, opto-electronics and environmental protection. A few companies have graduated from the Technology Park and had established their premises elsewhere. The 55 active companies based in the Technology Park have 317 employees of which two thirds have at least two years of higher education.

The main problems experienced by the management and professional staff of the Ljubljana Technology Park are the lack of financial support for the early stages of SME development, problems concerning the protection of intellectual property, the difficulties posed by very restrictive and rigid legislation and bureaucracy, and the isolation of high technology companies which generally expect more support than is available. Although the official period of tenure of companies in the Technology Park is four years, it is clear that in practice most companies are able to renew their tenure and remain within the protective environment of the Technology Park for

a longer time. The number of companies in the Park, as well as the number of spin-offs, has increased consistently over the years. There was a peak of new company establishment in 2000, since when the number of new annual registrations has diminished.

In Croatia the technology park initiatives have been also growing (EPPA, 2005). There are quite a number of innovation centres and technology transfer centres.[15] Among them five institutions could be considered as genuine technology parks: Technology Innovation Centre Rijeka; The Technological Park Zagreb; The Technological Centre Split; Technological Park Varaždin and Centre for Technological Development Slavonski Brod.

The first technology park was Technological Park Zagreb (TPZ) founded in 1994 as a combination of technology park and business incubator. Its main aims are to support business start-ups, advise entrepreneurs, provide business education and training, deliver project management and introduce quality certifications such as ISO 9000. It is supported by funds from the SME Development Programme of the Ministry of Crafts, Small and Medium Entrepreneurship. It has 1,300 m^2 of business premises and about 300 – 500 clients. Half of its operating budget comes from the municipality and the remainder from its commercial services such as renting space and facilities to other entrepreneurs.

The TPZ represents the largest concentration of entrepreneurs in the area of high technology development and innovation in Croatia. Out of 39 high technology private sector tenants, 21 left after successful incubation, while 18 are still incubating in the Technology Park. The firms that entered the Park have enjoyed impressive business growth and after leaving have on average 15 employees. Between 2001 and 2003 the firms within the TPZ developed 104 new products as a result of own technological innovations which have all been commercialised. In the course of 2004-2005, 88 new products were developed.[16] The TPZ gained an ISO 9001:2000 Certificate in 2002, and nine of the TPZ firms have also received a Certificate.

Technology Centres

A law on Technology Centres was passed in Slovenia in 1999. In contrast to technology parks, the technology centres focus on a specific industrial branch or region. The technology centres are co-financed by the Ministry of Economy. By the end of 2001, thirty one sectoral technology centres and four regional technology centres had been established. The centres provide participating companies with assistance in marketing

and legal and technical information, and links with R&D facilities in companies and in research institutes. One such centre is called TECOS – a technology centre for the machine tools sector. It provides services such as computer testing and CAD simulation analyses. The centre receives funding from infrastructure subsidies, the Young Researchers programme, and through funding for applied research projects. Public funding through these different programmes accounts for about 40% of running costs. Other funding comes from membership fees and fees for services. Technology Centres are supported by a specific measure within the 2002 "Programme of Measures" which aims to ensure the long-term linkage between the enterprises and the research and development sphere. Under the measure, the Ministry of Economy co-finances the costs of research and development projects, and the costs of introducing new services and support activities within the technology centres.

In Croatia there are five Technology Transfer Centres: TIC Rijeka, Technology Development Centre Osijek-TERA; TIC Split; Technology Transfer Centre Zagreb and Research and Development Centre for Mariculture Ston (CEC, 2006). Four of them were established by the Ministry of Science, Education and Sports (MSES) and with support by the local community. MESE supports the operation of these centres only through co-financing operational costs (overheads), The Ministry of Economy, Labour and Entrepreneurship (MELE) also supports projects for start-ups and innovation through these centres.

The Technology Centre Split operates as an incubator that promotes new technologies, innovations, and entrepreneurship. Its objective is to provide support for SMEs in order to develop innovation, know-how, technology, prototypes and to market preliminary products in as short a time span as possible. Its tenants are small, high-technology companies operating in the area of business software, process software, information and communication technologies, process automation, advanced internet services, and system and design optimisation. It was established as a project of the Ministry of Science and Technology of the Republic of Croatia jointly with the German Ministry of Science and Technology. It acts both as a business incubator and a technology transfer centre.

Technology Networks

The 2002 "Programme of Measures" included a new measure on "Promoting the Development of Technology Networks". It provides co-financing for the costs incurred in establishing the organisation and initial operation of technology networks,

and the costs of preparing long-term research and development projects. The purpose of technology networks is to identify and support investments in the development of new technologies in sectors where there a critical mass of knowledge already exists and a high level of interest in the application of this knowledge. Technology networks are also intended to widen access to new technologies and increase their use in other sectors. One of the most successful has been the ICT technology network led by IskraTEL from Kranj. The vice-president of the technology network is the head of the Faculty of Electrical Engineering. Other successful technology networks are found in the field of process control, biotechnology, and advanced materials (polymers). In 2004 two of these technology networks were supported through the government programme.

In Croatia, there are several types of business networks. Most were established by initiatives of the private sector through business organisations and associations. For example, the Croatian Employers' Association (HUP, Zagreb) in co-operation with USAID started a programme for networking enterprises within the Global Technology Network (GTN). The government supports a Network of Business Innovation Centres (BICRO) that was founded in 1997 and is closely linked with research institutes, universities and financial institutions, offering seed capital and various innovation schemes. The activities of members of this network are also stimulated by the funding from the Ministry for Economy Labour and Entrepreneurship (MELE) through its 2004 Project for Innovators, as well as from a World Bank loan to Croatia approved in 2005.

Additionally, the Ministry of Science, Education and Sports has in 2005 launched an initiative to create the Croatian Science and Technology Diaspora Network which aims to increase networking and connections with established Croatian scientists and experts who work abroad for the purpose of knowledge transfer and cooperation in new high technology projects. The specific emphasis of such cooperation is possible commercialisation of knowledge through start-ups of new firms that could increase the competitive potentials of the Croatian enterprise sector. As a part of the cooperation with the World Bank on its Science and Technology Programme (STP) MESE also established a special Fund (Unity through Knowledge Fund) which will finance joint research projects with Croatian science diaspora.[17] The World Bank Loan envisaged funding this important STP component with €3.7 million. The National Foundation for Science also promotes research projects of those Croatian scientists that want to return to Croatia in value up to €100,000.

Industrial Clusters

Industrial clusters have been highly effective as sites of innovation and economic growth in some notable cases such as Silicon Valley in the USA (Saxenian, 1994). Italian industrial districts have become a paradigm for a new form of economic development based upon dense clustering and networking of small firms in specific geographic locations. Networks of firms have been analysed as a potential source of improved competitiveness in transition economies (Franičević and Bartlett, 2001). The influential work of Michael Porter has stimulated a growth of policy interest in the beneficial effects of industrial clusters. Porter has argued that clusters permit the development of relationships between universities and clusters of firms in their locality which facilitates knowledge transfer processes (Porter, 2000). This and other experiences have created a strong interest among policy makers in various countries which have introduced public policies to support the creation of clusters involving both high technology companies and institutions of higher education such as the cluster policy introduced in Slovenia in 2001.

Several commentators have questioned whether clusters can be effectively created as a top-down initiative of government policy. Feldman et al. (2005) argues that effective clusters are created by entrepreneurs as a part of their strategic business strategy when economic incentives are favourable, and evolve rather than being the product of conscious design. She suggests that clusters are self-organising systems and that "while many seek to emulate the sustained competitive advantage an industrial cluster represents, these dynamic systems cannot simply be imitated but require the temporal development of unique and not easily replicated assets and capabilities." (Feldman et al., 2005, 130). Feldman goes on to describe how local universities in one US example responded to the spontaneous formation of clusters by biotechnology entrepreneurs by setting up branch operations closer to the cluster to offer a Masters degree in Biotechnology for workers seeking additional training and to stimulate industry-funded research. The universities in the area also responded to new opportunities by establishing incubators to encourage entrepreneurial spin-offs. This implies that linkages between institutions of higher education and clusters of SMEs may develop in the absence of government intervention, but require a flexible university sector that is relatively autonomous and decentralised and capable of responding to opportunities to transfer knowledge to the private sector as the demand for such services develops and changes.

Other commentators have stressed the international aspects of knowledge transfer and have suggested that in order

to work effectively as institutions of knowledge transfer, clusters need to adopt an outward orientation and link up with international systems of innovation in order to avoid stagnation due to intellectual inbreeding (Simmie, 2004).

In Slovenia a programme to develop industrial clusters involving both companies and research institutes began with a pilot programme in 2000-2003. One of the aims of the cluster measure is to promote knowledge transfer from research institutes to the companies which are members of the cluster. The programme provides co-financing of the costs incurred during the initial phase of creation of potential clusters, for the preparation of a joint development strategy, and for the costs incurred during the first two years of their operations.

The first three pilot clusters were established in the automotive industry, in transport and logistics and in tool-making. A second call for projects was issued in 2002 and further clusters were formed in wood processing, plastics, information and telecommunication technologies, acclimatisation and cooling and in high tech equipment for services in the tourist sector. The clusters include small companies, but the leading companies are normally medium sized or large companies.

A pre-condition to form a cluster is that at least one third of the members must be academic research institutions. The criteria are that at least ten companies and three research institutions must be involved in order to obtain financial support form the ministry. The cluster must provide its own co-finance, and is established through a legal contract. A cluster is developed in three phases: (i) in the first year the ministry provides 100% finance for the pilot stage – to create an atmosphere and to build trust; (ii) in the second stage a non-profit interest association is established with 40% co-financing from the ministry to establish an office and a management team; (iii) in the third phase the clusters are internationalised. The clusters are linked through the "Cluster Network of Slovenia" based at the Chamber of Commerce. According to the Chamber, new spin-offs within the cluster programme have come about mainly as a result of networking activity between the established clusters.

Altogether 36 clusters have been supported by the ministry of which 19 are considered to be successful, and operate on an international level. By 2004, 18 cluster offices were active, and 29 cluster projects were being supported (CEC, 2004b). These include the three pilot cluster initiatives, thirteen early stage clusters and thirteen developed clusters. They involve 350 companies and 40 education and research institutes, including the Universities of Ljubljana and Maribor. The total budget for the creation of new clusters was around €1.5 mil-

lion in 2003, and increased to €2.1 million in 2004. In addition, €1.3 million was allocated for existing clusters in 2003. The cluster programme is considered in a recent EC report to represent good practice, judged by the over-subscription of existing measures and positive conclusions from evaluation reports (CEC, 2004b).

Knowledge and technology transfer takes place between members of the clusters, and includes knowledge transfer from universities and research institutes to SMEs. The first spin-off companies which have been established through the activities of the clusters have been in plastics and engineering. The transfer of knowledge has also gone in the opposite direction – clusters have stimulated the development of new courses in the universities, for example courses on new technologies in the polytechnics.

A recent evaluation of the cluster measures (Jaklič et al., 2004) indicated that the main reasons for entering a cluster are (a) the financial subsidy from the state, (b) the commercial pressure for a higher degree of linkage and cooperation between companies and (c) improved access to information resources and knowledge transfer through joint projects. According to the study, interviewed companies reported positive effects of clustering, but two-thirds expect that it will take about six years before the benefits in terms of increased sales would begin to exceed the costs. Both value added and exports are expected to increase due to the positive effects on competitiveness of joint projects undertaken within a cluster. The report emphasized the benefits of improved communication, faster knowledge transfer among the actors in the cluster, and the possibility of offering more complex products. Overall, the study found that the government programme triggered off a process which would never have otherwise occurred.

In 2002 the Ministry of Economy began an additional programme to develop networks of small enterprises employing up to 50 workers in defined geographical areas. For example, networks of small firms have been established in the construction industry. The government plans to create at least 20 such networks by 2006, and provided a budget of €1.7m for this programme in 2003. The networks are assisted by the Small Business Development Centre of the Ministry of Economy. In 2003, the networks involved more than 550 companies and 50 R&D institutions. Among the institutions involved are faculties within the Universities of Ljubljana and Maribor, private colleges and business schools, R&D institutes, technology centres and the Ljubljana Institute of Economics (CEC, 2003).

Inter-firm cooperation and clustering are recognized as important modes for enhancing SME development by most of the governments in SEE (see Franičević and Bartlett, 2001). The National Competitiveness Council of Croatia has also listed these policies for SME development in its "55 Recommendations for Raising Croatia's Competitiveness" (2004).

The Croatian Government has issued a tender to provide grants of between €400 and €10,000 to promote clustering activities covering costs of business plans, studies, joint market approaches, development of ICT and databases to facilitate clustering. So far, there have been few projects initiated, including two in the furniture industry (Zagreb and Vinkovci) and the other one in the metal industry in Osijek (Singer and Lauc, 2004). The Croatian Wood Cluster was initiated in 2002 also with the assistance of USAID and has 20 members, while the Vinkovci Wood Cluster has 15 members and was initiated in 2004. The metal industry cluster was initiated in Osijek in 2003 and promotes cooperation between a growing mid-sized company and 15 smaller ones.

Young Researchers Programme

The universities have contributed to the science base in Slovenia by increasing the number of M.A. and Ph.D. holders in the R&D sector, which reached 31.5% by 2001 (MoE, 2003, 128). However, relatively few researchers were employed in R&D in the business sector where highly educated personnel accounted for just 12% of R&D employees. The Young Researchers programme aims to address this deficiency.

The Young Researchers programme was initially developed in 1985 in order to support the employment of younger researchers in research institutions, by paying their salaries and mentor's fees to the institution. It also aimed to support the transfer of young researchers from research institutes to employment in industry. The latter aim was not successful, as the best researchers stayed with the research institutions. To address this problem since 2002 the Ministry of Economy has given more attention to the mobility aspects of the programme. The "Young Researchers" measure now aims to promote the entry of young researchers from the universities into industry. It involves co-financing the continuing education of junior researchers employed by enterprises or technology centres for the duration of their studies. Under the programme, the government also pays part of the salary of newly employed post-graduate students. According to a recent report of IMAD this measure has been successful and the proportion of researchers in industry now exceeds the proportion employed in the research institutions. According to gov-

ernment data some 200-300 new researchers pass through the programme each year (MoE, 2003).

A Young Researcher Programme also exists in Croatia, but until recently has been mainly directed at attracting the best students to join the universities and research institutes in order to sustain research and teaching capacity. Since 1990 there has been a severe fall in the number of full-time employees in R&D sectors in both academic organisations and industry. However, according to the European Commission 2004 Report, this decline was smaller than in other countries in transition, for example the Czech Republic where annual rates of reduction of total employment in R&D was as high as 18.9% at the beginning of the 1990s as compared to Croatia's 5.8%[18]

Since 2005 the Croatian Ministry of Science, Education and Sports has supported the employment of young scientists in R&D in industry through the JEZGRE programme. This was recognized as a critical issue for future economic development. According to the available data at the Ministry, the share of young PhD holders in technical and natural sciences in total employment in the age group 25-34 in Croatia is only 0.17% as compared to 0.55% on average in the EU (and 0.97% in Finland). Also, only 17% of researchers are employed in R&D in industry, while in developed countries industry employs the predominant share of up to 70% of all researchers.[19] JEZGRE aims to help industrial R&D centres by providing financial assistance for employment of young M.A. and Ph.D. scientists for the period of four years.

CONCLUSIONS

This study has shown that there is a well-developed institutional framework to support knowledge transfer from research institutes and universities in both Slovenia and Croatia to the private business sector. In Slovenia, the government has developed a "Programme of Measures to Promote Entrepreneurship and Competitiveness 2002-2006" which contained a plethora of policy initiatives to support the knowledge transfer process. These have ranged from support for the creation of business incubators and technology parks, the development of technology centres and technology networks, the development of industrial clusters involving collaboration between industry and academic research institutions, financial support for high-technology SMEs and a Young Researchers programme to promote the mobility of junior researchers from R&D institutions to the business sector.

Similarly, in Croatia the government adopted a "Strategy for the Development of Science in the Republic of Croatia in the 21st Century", and in 2005 a "Croatian Science and Te-

chnology Development Policy". The government has established new institutions to develop a national innovation system, and has developed programmes to enhance cooperation between research institutes and universities and the business sector (HITRA, TEST, STRIP, RAZUM and JEZGRE). A business innovation centre network (BICRO) has been established which is designed to link innovative enterprises, research institutions, universities and financial innovations in an attempt to stimulate knowledge transfer and promote innovative activity. A set of institutions similar to those in Slovenia has been developed to facilitate knowledge transfer and the start up and growth of high technology industries including incubators, technology parks, technology centres, and a programme to stimulate the formation of technology clusters. However, the Croatian initiatives in this area are noticeably behind the equivalent measures that have been adopted in Slovenia.

The study has shown that the policy makers in Slovenia and Croatia have succeeded in establishing active programmes of knowledge transfer along almost all relevant dimensions. Yet, there remain doubts as to the extent to which these programmes are succeeding in fostering effective knowledge transfer between research institutes, universities, and the private sector. Recent reports from the Global Entrepreneurship Monitor (Rebernik et al., 2004) research programme have voiced these concerns for Slovenia and especially for Croatia (Singer and Lauc, 2004).

Our review of research findings presented in this chapter suggests that, despite much policy activity, technology parks and business incubators have failed to generate much spin-off activity in either country. Technology parks and incubators suffer from lack of support, weak protection for intellectual property and bureaucratic management. This suggests that the market failures highlighted in the introduction are having a significant negative effect on technology transfer through these arrangements. This is in line with the prediction by Arrow that the lack of appropriability of knowledge will lead to under-investment in knowledge transfer activities. The national innovation system based on the institutions of research institutes and universities needs to become more flexible and open in order to take advantage of the opportunities for the commercialization of research.

The Slovenian policies to develop technology networks, innovation clusters and to promote the mobility of young researchers appear to have been more successful than similar policies in Croatia. This may be related to the involvement of the private sector in the design and development of the technology networks and innovation clusters in Slovenia, as much

as to the role of the government support for these new institutional arrangements. The success of the networks and clusters in Slovenia as well as of the researcher mobility programmes indicates the importance of collaboration between the research and enterprise sectors. It suggests that the gradual development of social capital and trust between the actors within clusters and networks is an important factor to overcome some of the market failures associated with knowledge transfer, as discussed in the introduction. It also suggests that a successful policy to promote the knowledge based economy depends, as indicated in the introduction, on support for the development of local innovation systems and on building the institutional framework to facilitate reciprocal exchange of knowledge through clusters and networks. In emulating these elements of the Slovenian science and technology policies, Croatian science and technology policy is moving in the right direction.

NOTES

[1] This study builds upon an earlier research by one of the authors which focused on knowledge transfer in Slovenia (Bartlett and Bukvič, 2005).

[2] *Statistical Information 2005,* State Bureau of Statistics, Zagreb, p. 35; www.dzs.hr

[3] *Annual Report on Croatian Competitiveness 2003-2004,* Croatian Competitiveness Council, 2005.

[4] Some estimates are even lower than those of National Competitiveness Council i. e. 17% (Švarc, J., 2005).

[5] A third university was established in 2003 at Koper in western Slovenia.

[6] "A New Candidate for EU Accession– Croatia, S&T Developments", European Commission, Directorate General for Research, Brussels, 2004, p. 3.

[7] According to the GEM 2002 report the average score for Croatia is 2.11 (out of 5). The conditions improved only slightly since when the score was 2.05.

[8] *The summary of the main results is available in Innovation Focus /Inovacijsko žarište/,* (2005), Vol 2. No. 6. Croatian Ministry of Science, Education and Sports.

[9] For details see Račić, D., Radas, S., and Rajh, E. (2004) 'Innovation in Croatian enterprises: preliminary findings from community innovation survey', in: Švaljek S. (ed.), *Proceedings of the 65th Anniversary Conference of the Institute of Economics* Zagreb, pp. 403-427.

[10] *Population Innovation Readiness, Special Eurobarometer*, European Commission, August 2005.

[11] For details on HITRA projects see www.mzos.hr.

[12] BICRO was founded in 1997 – see www.bicro.hr.

[13] BICRO received €14 million.

[14] For details see *IRB Annual Report* 2003 and 2004 at www.irb.hr.

[15] For a comprehensive list visit www.poduzetnistvo.org, web portal on SME support institutions.

[16] See www.tehnopark.com.hr.

[17] For details see http://public.mzos.hr/Download/2004/09/24/UNITY_THROUGH_KNOWLEDGE_FUND.pdf

[18] "A New Candidate for EU Accession – Croatia, S&T Developments", European Commission, Directorate General for Research, Brussels, p. 29.

[19] Švarc, J. (2005) *Inovacijsko žariste*, The Newsletter of the Ministry of Science and Technology, Vol 2. No. 1, p. 4.

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Transfer znanja, institucije i inovacija u Sloveniji i Hrvatskoj

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Članak istražuje institucionalni okvir koji bi podupirao transfer znanja u Sloveniji i Hrvatskoj. U tranzicijskim zemljama na transfer znanja utječe nekoliko izvora tržišnog neuspjeha, što opravdava intervenciju vlade. Uspjeh ovih mjera ovisi i o sposobnosti akademskih institucija i

poslovnoga sektora da surađuju u tehnološkim mrežama, inovacijskim klasterima i pokretljivosti istraživača između ta dva sektora. Članak najprije istražuje inovacijski kapacitet dviju zemalja i zaključuje da je ukupna razina inovacijske sposobnosti u obje zemlje izrazito pomaknuta prema javnom sektoru u istraživačkim institutima i na fakultetima, premda je ukupna razina inovacijske aktivnosti iznad one novih zemalja članica Europske unije. Rad nadalje analizira politiku transfera znanja i institucionalni okvir za transfer znanja u dvije zemlje. Zaključuje se, prvo, da mjere koje podupiru tehnološke parkove i poduzetničke inkubatore ni u jednoj zemlji nisu uspjele potaknuti značajnije djelovanje "spin-off" tvrtki. Drugo, Slovenija je bila razmjerno uspješnija u svojim mjerama razvijanja tehnoloških mreža, inovacijskih klastera, nego što su to bile slične mjere poduzete u Hrvatskoj. To ukazuje na to da je postupni razvoj društvenog kapitala i povjerenja između sudionika unutar klastera i mreža važan čimbenik u nadilaženju tržišnih neuspjeha povezanih s transferom znanja.

Ključne riječi: transfer znanja, inovacija, mreže, klasteri, tržišni neuspjeh

Wissenstransfer, Institutionen und Innovationen in Slowenien und Kroatien

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Die Autoren untersuchen in ihrer Arbeit den institutionellen Rahmen in Slowenien und Kroatien, der dem Wissenstransfer zwischen dem akademischen und dem wirtschaftlichen Bereich dient. In den Transitionsländern steht der Wissenstransfer unter dem Einfluss mehrerer möglicher Quellen wirtschaftlichen Misserfolgs, was ein Eingreifen vonseiten der Regierung rechtfertigt. Der Erfolg neuer politischer Strategien ist außerdem abhängig von Einrichtungen im akademischen und geschäftlichen Bereich und ihrer Fähigkeit, gesellschaftliches Kapital durch technologische Vernetzung, Innovations-Cluster und eine erhöhte Mobilität von Forschern, die sich zwischen den beiden Bereichen bewegen, zu unterstützen und zu entwickeln. Im Artikel werden zunächst die Innovationskapazitäten Sloweniens und Kroatiens untersucht, wobei die Autoren zu dem Schluss kommen, dass sich das Gesamtniveau der Innovationskapazitäten in Forschungseinrichtungen und Fakultäten beider Länder ausgesprochen stark in Richtung öffentlicher Sektor verlagert hat, auch wenn die Innovationsaktivitäten insgesamt

betrachtet über dem Durchschnitt der neuen EU-Mitgliedsländer liegen. Des Weiteren analysieren die Verfasser die Politik des Wissenstransfers und den entsprechenden institutionellen Rahmen, den die beiden erwähnten Länder aufzuweisen haben. Sie kommen zu dem Schluss, dass zum einen die politischen Maßnahmen zur Unterstützung von wissenschaftlichen Parks und "Business-Inkubatoren" relativ schwache Resultate erbracht haben. Zum anderen scheint es, dass die in Slowenien betriebene Politik zur Entwicklung der technologischen Vernetzung und zur Förderung von Innovations-Clustern und der Mobilität junger Forscher sehr viel erfolgreicher ist als in Kroatien. Dies macht deutlich, wie wichtig politische Maßnahmen sind, die auf die Entwicklung menschlicher Ressourcen und die Herstellung von Vertrauen zwischen dem akademischen und dem industriellen Sektor ausgerichtet sind.

Schlüsselwörter: Wissentransfer, Innovation, Vernetzung, Cluster, wirtschaftlicher Misserfolg