

JOURNAL FÜR ENTWICKLUNGSPOLITIK

herausgegeben vom Mattersburger Kreis für Entwicklungspolitik
an den österreichischen Universitäten

vol. XXIX 2–2013

TRADING KNOWLEDGE IN A GLOBAL INFORMATION SOCIETY

The Southern Dimension of TRIPS and GATS

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mandelbaum *edition südwind*

Inhaltsverzeichnis

4	THOMAS R. EIMER, VERENA SCHÜREN Trading Knowledge: The Southern Dimension of TRIPS and GATS
11	PATRICIA GRAF Research and Development in Mexican-American Relations Post-NAFTA
31	THOMAS R. EIMER Global Wordings and Local Meanings: The Regulation of Traditional Knowledge in India and Brazil
51	CHRISTOF MAUERSBERGER Commercial Markets or Communication Rights? International Norms and the Democratisation of Media Markets in Argentina and Brazil
69	MARKUS RAUCHECKER Intellectual Property Rights and Rent Appropriation: Open Conflict regarding Royalties on RR Soy in Argentina
87	KENNETH C. SHADLEN The Patent Policy Trilemma
106	Book Review
108	Editors of the Special Issue and Authors
III	Impressum

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**Research and Development in Mexican-American
Relations Post-NAFTA**

I. Introduction

One might think that cooperation in research and development is something obvious, something that develops due to its very nature, “given the proclivity of science to go international” (Dufour 1995). The technological competition of the Cold War years seems to have dissipated, freeing the way for global cooperation in research and development. The advance of knowledge requires exchange and learning across borders. This is consistent with empirical data that shows an increasing number of transnational research projects with the participation of scientists from several countries, increased possibilities for communication that facilitate the exchange of knowledge, and the greater need for knowledge transfer through the increasing standardisation of products due to globalisation, as well as the increasing knowledge content of products. Nevertheless, research and development remains a conflict-ridden policy area. Knowledge is still kept secret, above all when it is linked to the military, but also because of profit motives. Innovation policy¹ is thus a dialectical field which oscillates between opening and closure. In addition to this, many interest groups do not see the advantages of cooperation in the area of research and development, particularly in the context of processes of opening, as they prefer to leave this to market forces. Another problem is that macro and microeconomic policies are too divergent to allow cooperation in the field of research and development.

Using the example of Mexico and the USA, the following will show the interest that two such different countries can have in the integration of research and development, what prevents this, and how economic integration creates new pressures. The North American Free Trade Area (NAFTA) has

significantly changed the structure of the participating economies. Documentation from the 1980s, such as *Face to face with new technology* (Thorup 1987), a publication by renowned scientists and politicians, provides evidence that there was in fact interest in a strategic partnership in this area. A glance at the facts shows, however, that although interaction in the area of Research and Development (R&D) exists and spillover effects took place in the context of NAFTA, this is happening on a much smaller scale than expected. The following article examines how regulations for the protection of intellectual property and the traffic of services that were set out in the NAFTA Treaty have changed the Mexican innovation system. This firstly involves determining to what extent the NAFTA conditions correspond to the expectations which were held at the time by the USA and Mexico. One advantage of shared regulations in the area of intellectual property is that it can improve the possibility of technology transfer between the participating countries. Drawing on secondary literature, it will therefore be examined to what extent spillover effects have occurred since the conclusion of the NAFTA Treaty. The perception of the regulations from the perspective of companies and research institutes will then be analysed, using expert interviews. This will show that the regulations had very differing effects on the various actors.

2. Integration in the R&D area in the context of NAFTA

2.1 Links between the innovation systems in Mexico and the USA

To what extent are there links or fundamental differences between the US American and Mexican innovation systems?² First of all, one is struck by the sheer size of the research and development (R&D) budget. The USA has the highest volume of investment in R&D worldwide; in 2006 they spent \$US 343 billion on research and development.³ Mexico is dwarfed in comparison, having spent \$US 5.6 billion in 2006. The reason for the smaller expenditure in Mexico is due to limited spending by the private sector which shows a restricted willingness to innovate (Interview P16, P2). This can already be seen as a barrier to shared activity, as it is difficult for businesspeople in the US to find contacts in the private sector. The unclear or indeed non-existent division of responsibilities in the Mexican case (as opposed to the USA) also makes cooperation difficult. In

the research field, however, there are links between the two countries. Both countries promote scientific quality and both countries produce researchers at the world level who are also internationally visible. In these areas, cooperation between the two countries already takes place on the individual level. Mexican researchers are well connected to international colleagues, above all with US American and Canadian scientists. In 1991, 44% of all co-authored publications in scientific journals were collaborations with US American scientists, while 29% of shared patents had a partner from the USA (OECD 2007).⁴ There is also regular exchange between research institutes. Above all, since Mexico's public research institutes have begun to rely on private sources of funding, the USA has become a popular market for Mexican innovations, as our case studies will show.

An important difference between Mexico and the USA lies in the policy fields innovation policy is associated with. In the USA, innovation policy grew hand in hand with security policy and drew legitimacy from this (Hughes 2006). Mexican innovation policy, however, grew mostly out of education and science policy (Casas 2004). Another problem involves the institutional structure: neither the USA nor Mexico has a ministry for technology, which means that cooperation efforts are more difficult to implement, as no ministerial decision is possible. A further problem is the decentralised structure of the USA as opposed to Mexico's centralised structure. As has already been set out, in the USA it is above all the states that finance R&D. In the Mexican case efforts are being made towards decentralisation (Corona Treviño et al. 2006); however the national technology council (CONACYT) makes the majority of decisions regarding expenditures. The states can finance on their own projects through mixed funds with CONACYT or other sector institutions, but this budget is still relatively small. Amongst the Mexican states, such as Nuevo Leon, there are some exceptions in which a greater amount of cooperation takes place with US states.

2.2 Mexico and the USA's interests in integration in the research and development field

The previous section has placed research and development in the free trade area in the context of the two innovation systems. The following will examine which interests both Mexico and the USA associate with the free trade area in the field of research and development.

NAFTA was signed in 1992 and came into force in 1994. It is a preferential agreement that provides for the dismantling of customs and trade barriers within the zone, but not for a customs union, as in the EU (Scheerer 2004: 4). The treaty regulates the free traffic of goods, services and capital. Although some areas were liberalised immediately, others were temporarily or completely removed, or were made subject to quotas, such as was the case with corn and beans (*ibid.*). NAFTA was the continuation of the “silent integration” of Mexico into the North American space, given that for years Mexico had been sending the majority of its exports to the USA (Schirm 2004: 188; for another perspective, cf. Preusse 2004). This silent integration had begun long before, above all in the border region. In 1965, during the period of import substitution industrialisation, the export processing zone had already been set up as part of the Border Industrialization Program. In this way, US American companies could set up factories within the zone. The components necessary for products could be imported from the USA duty-free, with only the added value being taxed when they were exported (Brenner et al. 2000: 261).

As has been mentioned, Mexico saw the opening of the free trade area as the only chance to make its economy competitive again. By opening the economy towards the USA, they hoped for the necessary technology transfer, direct investments and spillover effects. Mexican elites considered it more favourable to rely on foreign technology and to apply it to Mexican circumstances than to invest in the domestic research community (Thorup 1987: 6). At this point Mexico was already highly dependent on US technology: two thirds of Mexican contracts for technological rights of use had a business partner in the USA. The problem with this dependence was clear to the political elites, yet the high levels of debt in the country allowed little choice, and the hope of foreign direct investment seemed the most viable alternative (*ibid.*: 7).

Critiques of the NAFTA Treaty feared a too strong focus on the export economy and favoured a development strategy centred on the domestic market (Maaß/Witte 2003). Furthermore, critics worried that NAFTA would increase Mexico’s “economic, social and territorial polarization” as only some sectors and enterprises would be able to meet the Treaty’s requisitions and therefore benefit from free trade, while the majority and especially small firms would lag behind (Dussel Peters 2000: 2). There was also

a suspicion that an increase of the phenomenon of ‘brain drain’, that is the migration of highly skilled Mexicans, would occur (Aupetit 2006).

In the USA, the realisation that the country had lost its dominance in the research and development field played an important role in the search for partners. Towards the end of the 1980s, Japan and Europe were considered the prime competitors to the USA. In 1982 George A. Keyworth, Director of the US Office of Science and Technology Policy remarked somewhat cynically: “As I have stated on other occasions, there are a number of good reasons why we cannot expect to be preeminent in all fields, nor is it necessarily desirable. The idea that we can’t be first across the spectrum of science and technology is not simply a function of our current economic situation. The fact is that immediately after World War II this country was alone in developing and pursuing technology. Since then the rest of the world has been catching up – with much help from us” (cited in Rycroft 1983: 52).

Cooperation in the field of technology was thus seen as an “especially attractive option [...] Not only can joint action reduce the strain on American resources, but the capabilities of other advanced, industrialized countries, and occasionally those of underdeveloped ones, are welcome assets in the pursuit of the benefits of science and technology” (Rycroft 1983: 52).

This is particularly clear in relation to Mexico, where the USA saw potential assets in the free traffic of services in the research and development field. This attitude contrasted with that of the ‘techno-nationalists’, who – in the tradition of neo-realism – were convinced that technology transfer was not a mutually profitable empowerment of both business partners, but rather a danger to the domestic market or even a security threat (Florida 1995).

The convergence of both countries was also intended to regulate the migration flow. Related to this is the ongoing need in the USA for well-educated workers and engineers. The USA is to a large degree dependent on foreign scientists: “the List of American Nobel Prize Winners is full of Scientists who immigrated to the United States” (Hughes 2006: 19). One third of scientists and engineers in the USA were not born there. “Give me your educated engineers, yearning for opportunity” – this play on the words from the statue of liberty (ibid.) is also true of the relationship between the USA and Mexico. In the scientific field Mexico can certainly contribute to covering the US American need for foreign workers, but this

is less true for engineers or technicians. What is advantageous for the USA is viewed negatively in Mexico as a brain drain, and is considered by some scientists to be a problem for the whole nation (Aupetit 2006). This list of common interests in the field of research and development between the two countries could naturally not be fulfilled by NAFTA, given that NAFTA established a free trade area but was not supported by additional technology agreements (in the areas of environment and labour there are additional agreements). The Canadian author Dufour (1995) has found that “the NAFTA that came into force in January 1994 has little to say about the role of technology, or R&D in its agreement”. However, shared regulations regarding the protection of intellectual property rights are expected to raise the attractiveness of cross-border investments in research and development. Common standards and norms are intended to reduce the transaction costs of cross-border investments and to ease the flow of services. The following will present the NAFTA regulations that protect intellectual property rights.

2.3 Protection of intellectual property and the traffic of services in NAFTA

In contrast to the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) of the multilateral General Agreement on Tariffs and Trade (GATT), the protective rights under NAFTA are trilateral. The NAFTA Treaty was concluded around the same time as the TRIPS Treaty. The NAFTA Treaty both incorporates and further extends the TRIPS regulations, which is why the NAFTA regulations are often referred to as ‘TRIPS plus’ (Park 2012: 4). The NAFTA Treaty contains a commitment to the obligatory conventions, namely the Geneva Convention, the Bern Convention, the Paris Convention and the Convention of the International Union for the Protection of New Varieties of Plants (UPOV), all referring to the protection of property rights. Furthermore, Article 17 provides for further rights to protection. This section deals above all with trade secrets, patents, and copyright protection. There are important protective mechanisms for the fields of telecommunications, pharmacy, computers and computer accessories, machines, and space travel. Article 17 provides that all persons from NAFTA member states be treated as nationals, although each country can exclude areas that are not subject

to this provision. Chapter 12, which deals with the traffic of services, is also important for the technology trade and is a further extension of TRIPS. Here, too, service providers from the three NAFTA countries have to be treated in the same manner. Certifications must not present unnecessary barriers to trade. Moreover, TRIPS grants a minimum length of 20 years for patents from their application, while NAFTA grants a minimum of 17 years. This is sensible, as the period of application is often long. Differences are also apparent in Chapter 17 of the NAFTA Treaty. In contrast to TRIPS, this chapter imposes tighter restrictions on governments who might wish to limit or remove patent rights from the patent holders, for example when patent holders create monopolies or the patents are of societal interest. Both TRIPS and NAFTA address trademark counterfeiting and copyright piracy (UNCTAD/ICTS 2005). Article 1714 of the NAFTA Treaty operationalises these regulations by addressing the implementation of property rights at the border (Park 2012).

Even if customs charges for the trade of products and services with technological content were considerably reduced within NAFTA, there still remain both tariff and non-tariff barriers to trade in many areas, such as taxing cross-border payments for ownership rights (Manolakas/Brown 2000). The relatively strong regulations in Article 17 and 12 have been criticised, above all from the Mexican side, as they have prevented the desired spillover effects and technology transfers. For the patenting system, Shadlen (2012) has shown that there is a mismatch between the development profile of the Mexican Innovation System and the patenting system. Promoters of NAFTA have argued that without these strong regulations many US American companies would probably not have set up in Mexico and that NAFTA could bring important learning effects. As Shadlen shows, the promoters clearly form the stronger coalition. On the one hand, Mexico did not make use of the transition period for developing countries foreseen in both TRIPS and NAFTA. On the other hand, Mexico is a strong promoter of the Anti-Counterfeiting Trade Agreement (ACTA), an international framework that aims for joint actions to protect intellectual property rights (see European Commission 2010). Furthermore, Mexico prefers to cooperate with other OECD members in strengthening the IP system, whereas Argentina, Brazil and India are attempting to change the global IP system (Shadlen 2012: 309): these three countries advocate the “Devel-

opment Agenda at the World Intellectual Property Organization” (ibid.). Brazil and India also try to use the loopholes of the IP-System, for example by applying compulsory licensing to pharmaceutical patents (Süddeutsche Zeitung, 17.3.2012).

The policy coalitions and the historical pathways of Mexico’s IP policy have been investigated in depth. In the following section we will therefore examine what the NAFTA regulations mean for different actors of the innovation system and to what extent technology transfers and spillover effects have taken place.

2.4 Technology transfer and spillover effects in the context of NAFTA

Before presenting the three case studies, we will very briefly review the literature on spillover effects due to NAFTA. Direct investments raise the expectation that they will bring not only a flow of capital, but also new knowledge, administrative and management skills, and new technologies (Romo Murillo 2003: 230). In Mexico, technological learning was expected in the following four areas: education, innovation through quality management, information and documentation systems, and the renewal of equipment and technologies (Domínguez Villalobos/Brown Grossman 2004: 52).

Mexico was able to attract a high degree of direct investment. This was due, amongst other things, to the step-by-step liberalisation of the legislation that supports foreign direct investments (FDI) (Zschiedrich/Kubeile 2004: 32). The companies that invested came primarily from the USA, followed by Europe and Japan. These companies wanted above all to make use of the cheap cost of labour to undertake process or product specialisation. Therefore, the export of technology-intensive products from Mexico to the USA has risen.

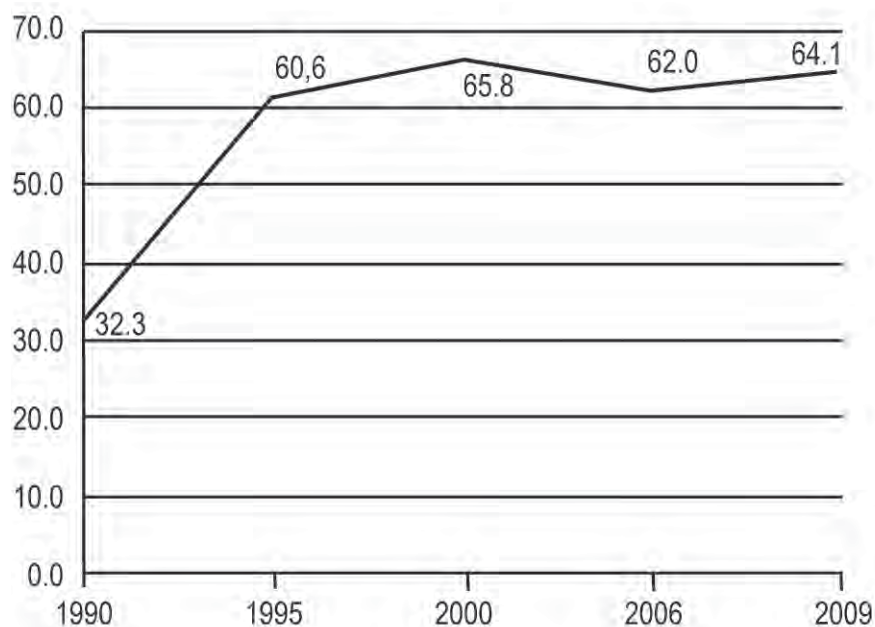


Figure 1: Development of exports with medium or high technological content as share of total exports from Mexico to US [in %], 1990–2009
Source: CEPAL (o.J.)

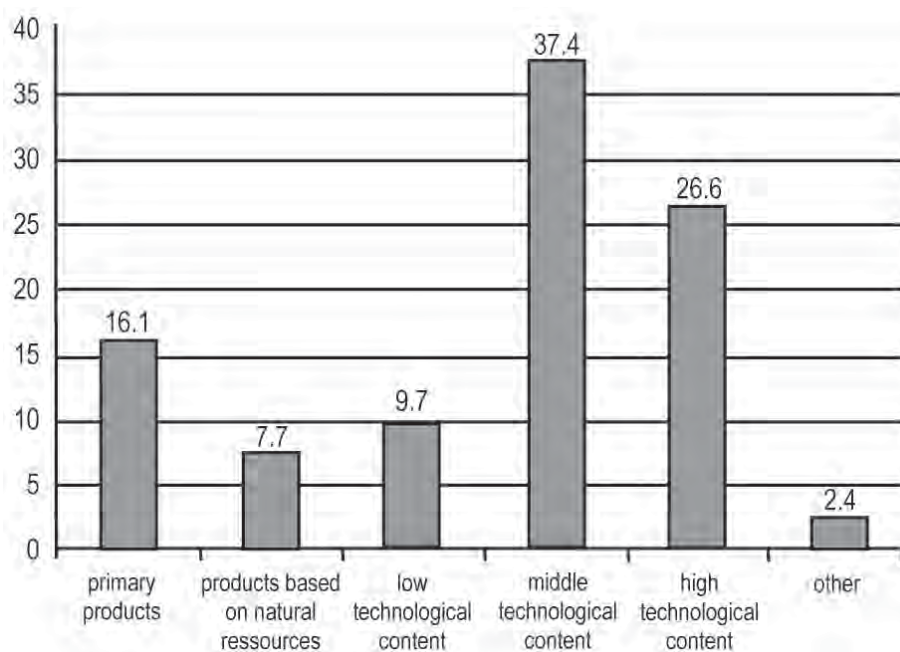


Figure 2: Exports per category as share of total exports from Mexico to US [in %] in 2009.
Source: CEPAL (o.J.)

In 2009, “products with medium technology content” represented the highest share of Mexican exports to the USA. The share of high-tech products rose from 7% in 1990 to 26.9% in 1999. It has since sunk slightly to 25% in 2006, still hovering around 26% in 2009. However, if we take a look behind the positive balance of technology, we see that, in the field of high-tech products, only a few production steps have been implemented in Mexico. That means that high-tech products are imported for a short term and the necessary labour-intensive production steps are undertaken in Mexico before exporting the product.

A series of high-tech products are now developed only in Mexico, such as Volkswagen’s new Beetle. However, in the case of most of these product specialisations, only the production takes place in Mexico, all other functions taking place elsewhere (Zschiedrich/Kubeile 2004). Most companies in these sectors are strongly dependent on foreign technology licenses (Musik 2000). This often means that companies have very little room to make improvements. With some exceptions,⁵ most in-house innovation takes place in the marketing or organisation fields.

NAFTA has meant positive growth for Mexico. However, Musik suspects that Mexico may already have exhausted NAFTA’s benefits and can no longer compete with countries with even lower wages. There is also a dual economy: Some strong companies have realised the opportunities that NAFTA offered, in contrast to a large number of small or medium-sized enterprises (SMEs) which have no room to manoeuvre in order to take up these opportunities. This duality is also geographic, as some states such as Nuevo Leon or Jalisco have used their opportunities, while others were thrown even further back. The duality is above all due to the fact that many companies were reluctant to implement structural adjustment and did not react to new innovation processes, but rather continued, and still continue to, attempt to remove the free trade area (Musik 2004).

3. Perception of the measures to protect intellectual property amongst Mexican businesspeople and researchers

Following the previous examination of the effect that the NAFTA regulations were intended to have on technology transfer, the subsequent section will examine how the protective measures are perceived by Mexican businesspeople and researchers. For this purpose, the shoe cluster in the states of Jalisco and Guanajuato will be used as an example for the low-technology sector, and the electronic and software cluster in Jalisco will be used as an example for the high-technology sector. A research institute focused on applied science will be used as an example for the scientific sector. The three cases are only examples of the manifold effects NAFTA has on the Mexican economy, and were chosen as they show the variety of impacts. They are part of a bigger research project that compared innovation policy in Jalisco and Guanajuato. It showed that economic and political actors in Jalisco are very proactive, while in Guanajuato the actors from science dominate and business is only partially included in the policy making process. With regards to NAFTA the cases show different reactions: fear and anger, adjustment, and over-eagerness.

3.1 Method

The empirical observations were drawn from regional studies and 64 qualitative, face-to-face interviews conducted by the author with government officials, members of the regional scientific community and business associations from Mexico City, the state of Jalisco and the state of Guanajuato. In the following, 16 interviews are presented in depth, while the interviews held with experts from Mexico City and Guanajuato served to gain an understanding of general Mexican innovation policy and of regional innovation processes and thereby provide an important source for contextualisation. All interviews took place between July and October 2007 during the author's stay as guest researcher at the Colegio de Mexico. The interviewees were questioned about their negotiation strategies, their preferences, and their attitude towards the policy field. The interviews are cited anonymously and have been rendered in the text as Person 1 (Interview P1), etc.

The transcripts were analysed by means of a qualitative content analysis (Mayring 2008). The qualitative analysis was supplemented by a quantitative analysis of three interviews, which helped to identify diverging connotations of the terms technology, innovation and patenting.

3.2 The electronic cluster in Jalisco

The electronic cluster in Jalisco dates back to the 1960s, when several big companies in the electronics industry such as IBM, Kodak, Motorola and Siemens set up in the state. Since then, the electronic industry has undergone several transformations and has recently diversified with the development of the software industry. When NAFTA came into force, businesspeople in the electronics industry first complained about the heavy burden it created. However, they then began to use innovation policy instruments to cope with the new circumstances. They also tried to actively influence innovation policy and launched a programme to support the software industry (PROSOFT), together with the regional government. The aim of the programme is to support the development of software made in Mexico. Ultimately, this should increase the volume of patented technologies (Interview P4). Conflicts with the NAFTA regulations are run of the mill quite frequent, as the software development often involves the reproduction of already existing technology. “There are companies that make software, for example for hospitals and we do the hardware. There are others that work with GPS. These are things that already exist in the world but we want to do it here in Mexico with Mexican technology and replace the technology already existing” (Interview P3). However, this objective runs contrary to the role of Mexico as a leading promoter of the Anti-Counterfeiting Trade Agreement (ACTA; for an overview of this promoter role see Shadlen 2012: 309). Thus, even in the electronics and software industry, which are high-technology sectors, there are conflicts relating to NAFTA.

With regard to learning, most of the learning processes were established before NAFTA. Since the 1960s, IBM, in particular, invested in all four areas of learning described in section 2.4. Further initiatives by the Mexican state or by corporate business, such as the foundation of a Campus of the Technical University of Monterrey in Guadalajara, cannot

be directly linked to NAFTA. With regard to its attitude towards NAFTA the electronics and software industry tries to adjust to the regulations, but in some areas also runs contrary.

3.3 The shoe cluster in Jalisco and Guanajuato

NAFTA is also a burden for the shoe cluster in the states of Jalisco and Guanajuato. The industry associations have therefore attempted to reorient the sector, trying to make Mexican footwear internationally recognised for its high quality. A new certification standard for shoes was implemented, as shoe producers were not able to reach the previous norm (ISO 9000) and wanted to proceed more slowly in the certification process (Ruiz Durán 2000: 33). Furthermore, a design institute (INMODA) was founded in the state of Guanajuato. However, due to political conflicts and the dominance of some footwear entrepreneurs, INMODA was soon closed (Martinez 2006: 124; Interview P8). Nevertheless, these initiatives can be seen as direct learning processes stimulated by NAFTA in the areas of quality management and information systems. Besides these initiatives, little was done to improve the conditions of shoe production. Shoe companies have been inactive for a long time, hoping that the federal government would manage the challenges caused by NAFTA. Radical innovations – such as a completely new design, the exploration of new consumer groups or new material – are mainly due to the contact with suppliers of equipment or material. These suppliers are both national and international; therefore, the learning effects can be seen as being partly stimulated by NAFTA.

One of the main problems in the shoe sector is the great mistrust and lack of cooperation between entrepreneurs. Little information and technology is shared between companies (Interview P16, P9, P10, P11, P12, P8, P13). Family networks are still the major sources of information exchange between enterprises (Martinez 2006: 120). Networks between entrepreneurs do exist, but they are generally between shoe manufacturers and suppliers (Interview P16, P10, P9, P11, P14). In contrast to the strong links between universities and companies in the electronics and software industry, such links are weak in the shoe industry. Martínez (2006) has shown that many entrepreneurs are not aware of the opportunities to undertake vocational training at local universities. Therefore, NAFTA has not strengthened learning effects in human capital. Even before NAFTA, these entrepre-

neers were reluctant to cooperate because they wanted to protect their trade secrets; however, the free trade agreement has intensified this pre-existing climate of competition. Moreover, technological content in the footwear industry is largely based on tacit knowledge, but no codification of this knowledge has taken place (Martinez 2006: 265).

Furthermore, the co-occurrence analysis of three selected interviews showed that the interviewees (Interview P16, P15, P10) do not at all connote technology, competitiveness and development with patents. With regard to intellectual property, companies in the footwear sector in Jalisco and Guanajuato thus face similar problems as other SMEs worldwide. Concerning NAFTA, the shoe industry fears its propositions and is angry that it has been left alone in the adaptation process.

3.4 Research institutes in Guanajuato

There are some winners as a result of the NAFTA regulations, namely high profile Mexican research institutes. Interviews with members of two institutes in Guanajuato showed that these institutes are highly embedded in international research networks. The NAFTA guidelines for the free traffic of services offer the research institutes new possibilities (Interview P1, P5, P6, P7). One research institute covers the majority of its budget by providing technological services for companies or research institutes in the USA (Interview P1). The initiative for such cooperation was taken by a scientist who had gained experience of the European and US American scientific contexts while completing his Ph.D and post-docs. Scientists from both research institutes also stated that they were interested in cooperation with Mexican companies (Interview P1, P7). However, in the past such requests from the business sector were mostly for small, insignificant issues, the solving of which was not in the interest of the scientists. Mexican companies are also often not prepared to invest money in research cooperation (Interview P1, P7). One scientist criticises Mexican innovation policy for not daring to admit that money can be made with science, for example through the provision of services for companies in the USA. Instead, the few good basic researchers in Mexico are subordinated to the interests of local business (Interview P1). To sum up, at least one institute has learned in all four areas described in section 2.4. It has professionalised its management and information system and has adapted

to the quality standards required by US companies and research institutes. The international research networks also facilitate the interchange of personnel and therefore enhance the quality of human capital. Furthermore, the money earned with international R&D services can be invested in the renewal of equipment and technologies. It is therefore no wonder that this research institute belongs to the coalition that wants Mexico to promote a strong patenting system. Together with other research institutes, this institute forms the group of enthusiastic adherents. They see NAFTA as a big opportunity, as it strengthens their quest for internationalisation. Therefore, they are opposed to other researchers that claim that research should have an impact on local (Mexican) problems. These researchers, in contrast, consider the international IP and publication system as one major barrier to the social effect of research.

4. Conclusion

“It was always clear at all stages of the TRIPS negotiations that the principal players (US, EC and Japan) saw TRIPS as setting only minimum obligations. Nevertheless, developing countries might reasonably have expected the World Trade Organization (WTO) or World Intellectual Property Organization in some cases to become the principal fora for the negotiation of new intellectual property standards” (Drahos 2002: 17). The NAFTA Treaty is evidence of the fact that the USA was able to tighten their minimum standards as a result of TRIPS. Since the NAFTA Treaty was not equipped with an additional agreement in the field of technology transfer, this tightening of standards has to date been to the detriment of Mexico. In view of the motivations that prompted Mexico and the USA to cooperate in the fields of R&D, it is clear that the results remain considerably below what could be expected. The results of Kenneth Shadlen show that this is due to an actor constellation that pressed for the introduction of a strong IP System, but neglected the need for accompanying innovation policies. Cooperation in the fields of R&D is still considerably behind the level of economic integration in the North American area. This means that neither NAFTA partner can make optimal use of the free trade area, although the consequences for Mexico are probably worse. As the qualita-

tive analysis shows, there are big differences between the sectors. Even in the states of Jalisco and Guanajuato, which are often cited as examples of successful regional innovation systems, the discrepancies between winners and losers of in NAFTA are substantial. The quantitative analysis of the interviews showed that the strong patenting system in particular does not match the demands of the shoe industry, which does not use patents as tools to secure intellectual property and is rather reluctant to cooperate with universities. Instead of 'innovation' the interviewees use the terms 'development' and 'competitiveness'. Their general use of the term 'technology' shows that they have no specific idea what technological innovations could be in their case and how they could secure these innovations with patents. The qualitative analysis shows that there is a need to support design-driven innovation and quality management. With regards to this, NAFTA has stimulated innovation.

The case of the electronics and software industry differs from the shoe industry with regards to their reaction towards NAFTA. The entrepreneurs tried to adapt to the quality standards and to innovate. Nevertheless, for these very dynamic actors too, the patenting system is a barrier. Drawing on the qualitative analysis, the high profile research institutes seem to be the winners of the NAFTA regulations. They were able to professionalise and strengthen their international networks. These findings fit with the research carried out by Kenneth Shadlen on actor constellations in the pharmacy sector and by Marcela Suárez Estrada on networks in the nanotechnology sector. In order to broaden the base of those that can draw advantage from the NAFTA regulations, flanking measures in the R&D field are needed. Besides the actors that pushed the patenting system, as described by Shadlen, there are various political actors and innovation researchers on both sides of the border who are calling for the incorporation of "science, technology and innovation matters in the relations between Mexico and the United states" (Solleiro/Castañón 2005: 1069). Until this happens, it is clear that the "liberating forces of science and knowledge" that Dufour hoped for have not developed post-NAFTA.

- 1 Innovation policy is focused on the whole innovation system, while technology policy is directed towards the technological system, and science policy towards the scientific system (Lundvall/Borrás 2005: 607). An example for Mexican innovation policy is the support of R&D networks in the Software Industry of the State of Guanajuato,

which aims at connecting research institutes with software developers (see Graf 2011 for an evaluation of this policy).

- 2 I am not referring here to the compatibility of the two economies, but rather to the basic orientation of the public and private institutions in the research and development field.
- 3 Measured in % of GDP they are surpassed by Japan. The USA is also neither the leader regarding the number of patents per capita, nor the number of researchers per capita. In the first case Japan is leading in the case of researchers Finland is leading (OECD 2006).
- 4 This point also demonstrates Mexico's high dependence on foreign countries, as Mexico is the country with the second highest rate of co-patents (of all patents) (OECD 2007: 3) which means that in many cases the infrastructure is missing that would allow these patents to be developed alone.
- 5 The companies Delphi (Carrillo/Hualde 1997) or IBM (Interview P3) can be considered exceptions.

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List of Interviews

- P1: Representative of Cinvestav, 2.10.2007, Irapuato, Guanajuato.
- P2: Expert from the Colegio de México, 23.8.2007, Mexico City.
- P3: Expert from Tec de Monterrey, Campus Guadalajara, 14.9.2007, Jalisco.
- P4: Representative of the National Chamber of the Information, Technologies, Electronics and Telecommunications Industry (Canieti), 13.9.2007, Guadalajara, Jalisco.
- P5: Representative of CINVESTAV, 2.10.2007, Irapuato, Guanajuato.
- P6: Representative of CINVESTAV, 3.10.2007, Irapuato, Guanajuato.
- P7: Representative of CIMAT, 4.10.2007, Guanajuato.
- P8: Representative of the technology council of Guanajuato, 26.9.2007, Guanajuato.
- P9: Engineer from the CIATEC, 28.9.2007, Leon, Jalisco.
- P10: Representatives of the Chamber for Shoe Suppliers/Leon, 2.10.2007, Leon, Jalisco.
- P11: Representative of CIATEC, 2.10.2007, Leon, Jalisco.
- P12: Expert from the Faculty of Social Sciences of UNAM, 19.10.2007, Mexico City.
- P13: Representative of the Union of Social Entrepreneurs, 7.9.2007, Guadalajara, Jalisco.
- P14: Expert from CIATEC, 11.9.2007, Guadalajara, Jalisco.
- P15: Representative of the Chamber of the Textile Industry Guadalajara, 12.9.2007, Guadalajara.
- P16: Representative of the Chamber of Commerce for the Footwear Industry, 7.9.2007, Guadalajara, Jalisco.

Abstracts

The following article examines the influence that the NAFTA regulations to protect intellectual property and the traffic of services have had on the Mexican innovation system. To begin with, Chapter 12 (traffic of services) and Chapter 17 (intellectual property) of the NAFTA regulations will be compared to the provisions of the TRIPS agreement. This will be followed by a consideration of the spillover effects that have occurred since the introduction of the NAFTA Treaty. Following this, the article examines the innovative behaviour of Mexican companies and research institutes since the introduction of NAFTA, and analyses how the treaty is perceived by the latter. The work is based on a document analysis of the NAFTA Treaty as well as on interviews with trade associations, researchers and politicians in the field of innovation policy, which were carried out by the author in 2007.

Der folgende Beitrag untersucht den Einfluss der NAFTA-Regelungen zum Schutz geistigen Eigentums und zum Verkehr von Dienstleistungen auf das mexikanische Innovationssystem. Kapitel 12 (Verkehr von Dienstleistungen) und Kapitel 17 (geistiges Eigentum) der NAFTA-Regelungen werden zunächst mit den Bestimmungen des TRIPS-Abkommens verglichen. Danach werden die Spillover-Effekte untersucht, die seit der Einführung von NAFTA beobachtet werden konnten. Welchen Einfluss die NAFTA-Regelungen auf das Innovationsverhalten mexikanischer Unternehmen und Forschungseinrichtungen haben, wird mit Hilfe von drei Fallstudien herausgearbeitet. Die Arbeit basiert auf einer Dokumentenanalyse des NAFTA-Vertrags sowie Interviews mit Verbänden, ForscherInnen und PolitikerInnen im Bereich der Innovationspolitik, die von der Autorin im Jahr 2007 durchgeführt wurden.

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