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SUPPORTING UNIVERSITY TECHNOLOGY TRANSFER - STRUGGLES AND BARRIERS IN LATVIA

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Abstract

The goal of enhancing science-industry cooperation with the aim to boost countries' innovation performance has been a part of various development strategies in European countries for quite some time and an array of incentives is targeted at elements of national innovation systems in order to facilitate university technology transfer. This paper aims to discuss these incentives in Latvia - a small country in transition, with a relatively poor innovation performance and with a pressure to shape its industrial and research policies towards industrial development and sustainable growth. Latvia is a country still recovering from the recent financial crisis and trying to overcome the problems of the past when it was a part of the Soviet Union - a background that gives specific characteristics for the environment in which researchers and firms operate. This paper focuses on the chosen policy mix and incentives for supporting science-industry linkages in Latvia and how it matches the structure of the economy. We suggest that the chosen approach (which is more often than not inspired by foreign success stories) fails and causes a mismatch between both realms and thus slows down the improvement as it tries to address not the causes

of low cooperation such as business sector's low innovation absorption capacity that impacts technology transfer processes in a significant way, but instead alleviates the symptoms e.g. low R&D expenditure. We use case study approach, relying on desk research, interviews with key policy makers as our data sources.

Keywords: University technology transfer, research and industrial policy, innovation absorption, policy transfer, policy failure

1. INTRODUCTION

Knowledge and technology transfer activities are considered an important driver of innovation performance and need to be looked at when a country aims to improve this performance (Calcagnini & Favaretto, 2015).Thus, it is no surprise that a vast amount of literature is dedicated to the topic. In the US, the issue of technology transfer and university-industry collaboration became increasingly contested during the late 1970s to 1980s, in part for political reasons, but also due to concerns about the country's competitive advantage in the increasingly global marketplace (Grimaldi, Kenney, Siegel, & Wright, 2011; Mowery, Nelson, Sampat, & Ziedonis, 2004). In a similar fashion, the debate about necessary incentives to support technology transfer and science-industry collaboration has intensified in the European Union over the last decade. The worst performing Member States of the EU now face significant pressure to improve performance in these activities. To counter the apparent malperformance, governments have been developing and implementing reforms to establish well-balanced innovation systems within their countries, including university reforms to improve technology transfer (Calcagnini & Favaretto, 2015; Goldfarb & Henrekson, 2003).

However, in some cases it has been a challenge stretching out for more than two decades and still ongoing. One of such cases is Latvia – a post-Soviet country who restored its independence in 1991. Same as for some other Central and Eastern European (CEE) EU member states, there is still a long way for Latvia to catch up on countries that are European innovation leaders – Denmark, Sweden, Finland and Germany (European Commission, 2015). When looking for solutions, policy makers often rely on case studies of best examples from the universities in the U.S. and the aforementioned European innovation leaders. However, the best practice examples from the innovation frontrunners are not that easy to implement. At the same time, government incentives (or lack of thereof) in countries with poor innovation performance is not as widely discussed and explored for policy making purposes. Additionally, while there is literature discussing knowledge and technology transfer activities as such, considerably less literature touches upon various policy instruments that the governments could exploit to support these activities and how the specific support initiatives are designed at government level (Rasmussen, 2008). Therefore, we intend to cover this gap in the literature.

One explanation for the relative weakness of innovation performance in Latvia is the weakness of its institutions – both formal and informal – largely being the result of transition. However, to explain the somewhat weak performance in terms of technology transfer, one has to look at the source of funds for R&D and innovation, which currently plays a very significant role. In many of the CEE countries with weak innovation performance, private sector R&D spending is lagging behind public investment. At the same time a substantial part of public investment in some countries, including Latvia, comes from European Structural and Investment Funds (ESIF). ESIF funds, however, have their own constraints, such as greater bureaucracy if compared with national funding, as well as limitations to commercial exploitation due to incorrect application of state aid regulation. Therefore, this paper aims to contribute to the discussion on university technology transfer of publicly funded research results. We also discuss ways to improve innovation performance in countries in transition by discussing the experience of Latvia - a small country with relatively low R&D spending both in absolute and relative terms (0.68% of GDP in 2014) and a historical background that continues to influence the economy resulting in low innovation absorption capacity among other things. Despite implementing major structural changes the question whether they have been successful is still relevant for Latvia even after a decade within the EU.

The paper provides a case study of government incentives in Latvia that are aimed at fostering science-industry linkages and university technology transfer. The second section looks at the historical background and structural changes that impacted and continues to shape the national innovation system significantly as well as the current situation. The third section discusses the types of support programs, their management on a government and also university level. The fourth section evaluates and how well the chosen policy mix matches the circumstances, while the conclusions are discussed in the fifth section.

2. R&D ENVIRONMENT AND INNOVATION SYSTEM IN LATVIA

2.1. Latvian R&D during the Soviet era and the transition period

The roots of current issues within the national innovation system and the problems related to insufficient science-industry linkages in Latvia stretch all the way back to the time when it was a part of the Soviet Union and the subsequent transition period. Because of these events numerous radical changes in the innovation system have occurred and that has left a negative effect on the country's innovation performance.

During the Soviet period Latvia was a part of a massive, inflexible, inefficient and fragmented system without a central overview and efficient coordination (Rambaka, 2012). The system that Latvia was a part of spanned the entire Soviet Union meaning that various processes were often dispersed both

organisation and location wise. It could particularly well be seen by looking at elements of the innovation system - basic research, fuelled by military-driven competition, was connected to the military but not accessible for civil applications due to secrecy issues and was conducted by the Academy of Sciences, the main decision making body in the USSR when it comes to R&D. Applied research was linked to branch institutes and industrial sector. The area that was under pressure from foreign competitors was the military sector. Meanwhile, as Egorov and Carayannis (1999) discuss, many specialists were concentrated in traditional sectors with low potential for innovation and this heritage has also influenced Latvia's innovation performance in years after. Latvia specialised in areas like mechanical and electrical engineering, metallurgy, chemicals, timber, textiles and food processing industries - industries that were areas of specialisation for Latvia already during the interwar period. Latvia had strong industrial research capacities (European Commission, 1999) and despite the overall system being inefficient, scientific achievements were still made in both fundamental and applied research and the Baltic region even was one of few regions in the USSR that commercialised research results, thus attracting foreign investments (Kristapsons, Dagyte, & Martinson, 2003).

After the collapse of the Soviet Union, Latvia restored its independence in 1991, inducing radical changes in all spheres with a complete restructuring of the economy. Once again, Latvia almost instantly found itself without the previously accessible markets – the previous time was when Latvia was first established as an independent state in 1918. Given that peculiar distribution of industrial/applied research in the Soviet Union, where industrial research was performed by dedicated research institutes often serving the needs of industry located in other Soviet republics, after the collapse of the Soviet Union Latvia found itself with excess R&D capacity, which could not be utilised by local industry alone. A similar situation was in the industry more generally, which found itself cut off from its core trade partners. And just as in the 1920s, establishing access to other now missing parts of value chain, such as raw materials and energy supplied from other parts of the Soviet Union, was important. Meanwhile, a decision to continue the support for the enterprises basically meant turning them into burdens for the country as they were unable to respond to the new demands of the market economy. Thus, as markets dwindled, so did the industries were Latvia had specialised. Similarly, the research sector had to adjust to different funding approach, since no elements of competition were present previously.

After initial collapse in the early 1990s, manufacturing industry started to recover after 1996, however, industry was being gradually substituted with services, as the main economic sector. Besides, most of the industry with relatively high value added – the only natural partner for R&D and technology transfer, was declining at a faster pace, initially due to demand shock, but later due to the so-called Vanek-Reinert effect (Kattel, Reinert, & Suurna, 2009). Given that Latvian government from early on decided to rely on liberal economic

policies, and due to budgetary constraints, no substantial support was provided to stabilise and support industry in Latvia. In its report European Commission(1999) particularly pointed out the largest pharmaceutical company in Latvia Grindex who did not at the time receive support from the government to improve business although an R&D intensive company would have been highly favoured by a Western government.

Main policy measures focused on providing basic "life support" to the science and research system as well as integrating research with higher education and linking researchers with existing needs. Another step that needed to be taken was development of a system for research funding that would provide at least the bare minimum horizontally across all filed of science and research.

Because of the planned accession to the EU, it was necessary to direct R&D towards European and national priorities and the first priorities were indeed set in 1997 (Cabinet of Ministers defined priority research fields with the aim of establishing National Research Centres). As no decisions regarding specialization in certain domains in science were made at the time, the priority areas were very broad and inclusive. As many companies and institutes became autonomous, were downsized and in many occasions divided into smaller establishments, the innovation system became very fragmented. Besides, it had very limited funding which was not focused on specific areas in order to get the critical mass necessary to produce high level research outputs, industrial R&D capabilities, the capacity of companies to absorb innovation was reduced (Kristapsons et al., 2003). These characteristics led to challenges to implement coordinated activities and a unified research policy and have influenced science-industry linkages even until this day. Universities and institutes face insufficient R&D funding from the industrial sector as during the early transition years the links between industry and science were broken, research institutions became heavily dependent on state budgets, international co-operation and funding from the EU in form of research grants became a second source of income (European Commission, 1999). There was some development in terms of support for basic research while applied research was somewhat left behind due to insufficient coordination between the Ministry of Education and Science (MoES) and the Ministry of Economics (ME). Up until now, university technology transfer lacks significant results for a number of reasons. First, many companies are reluctant to cooperate because of the bureaucratic funding mechanisms and uncertainty of commercial benefits from investing in R&D among other factors. Second, most of the companies lack the absorptive capacity necessary for uptake of research results produced by universities and research institutions.

2.2. Current R&D and innovation environment in Latvia

According to the Innovation Union Scoreboard 2015 (IUS), Latvia's overall innovation performance has been ranked the third worst among the EU

member and despite the efforts of Latvian policy makers to include support for innovation in national development strategies. In fact, as Veugelers has argued in a recent paper (2015), the divide between top performers and laggards has been increasing in the EU, where Latvia's innovation performance is just 30 per cent of that of the innovation leaders.

Strategies, reports, assessments and evaluations done by either local ministries or by foreign experts list many causes for this poor performance, such as a fragmented national innovation system, very little funding for research, lack of cooperation and significant under-investment in research from the industrial sector, lack of commitment from the policy makers among others (Arnold et al., 2014; MoES, 2013; Smidova, 2015). The problems and causes of the insufficient performance are not really that different from those identified early in the transition period by the Danish Research Council (1992) and later by the European Commission (1999). Data on R&D expenditure over the last 15 years suggests that the commitment from both private and public sector to R&D has not sufficiently improved. Fluctuations of Gross domestic expenditure on R&D since 2010 are shown in Figure 1.

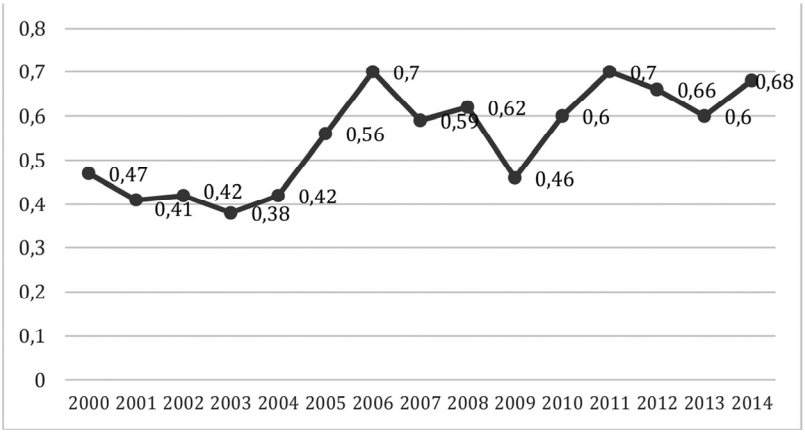

Figure 1 Gross domestic expenditure on R&D, 2000-2012, % of GDP

Source: Central Statistical Bureau of Latvia (CSB, 2015)

Total R&D expenditure in 2014 reached 0.68% of GDP, despite the Law on Scientific Activity (in force from 2005) that states an increase in funding should be at least 0.15% of the GDP on an annual basis until it reaches 1%. However, innovation policy has not really been among the top government priorities – the government doesn't have a long term strategic plan, but is constantly engaged in trying to solve urgent matters instead. This could be seen when the crisis hit and the budget for R&D was one of the first things that were cut and also now – investments in R&D keep fluctuating despite understanding the need to increase it.

The data in Figure 2 show that over time the funds available through various EU programmes have to some extent replaced government funding - total funding for R&D by foreign countries accounted for some 0.30% of GDP in 2014. This is a not a positive trend as the research system should be able to sustain itself when the funds eventually run out.

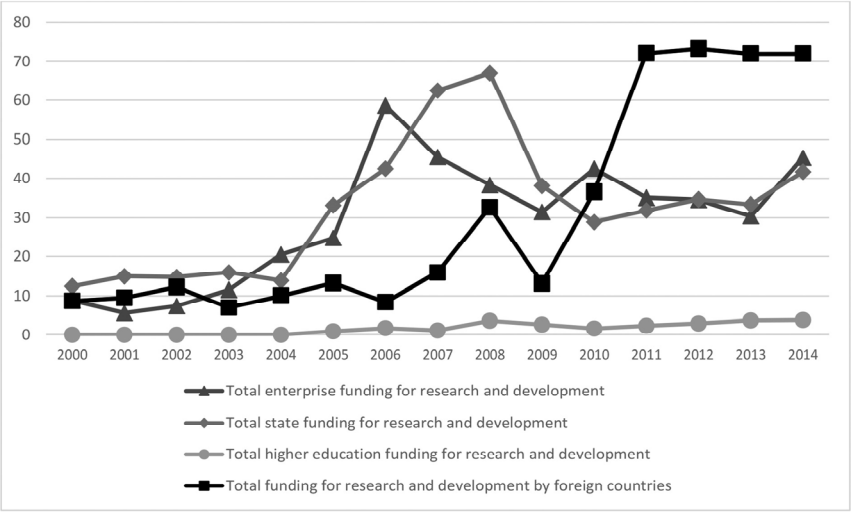

Figure 2 Expenditure on R&D by sector, 2000-2012, mln euro

Source: Central Statistical Bureau of Latvia

Latvia's innovation performance has fluctuated over time. According to the IUS(European Commission, 2015), Latvia is a modest innovator but shows signs of improvement and has recently become a leader in innovation growth. However, Latvia's innovation performance still is below the EU average for most indicators measured by the IUS. Data also shows that in both 2014 and 2015, indicators most important for fostering technology transfer - R&D expenditures in the business sector and public-private scientific co-publications– were among the lowest (European Commission, 2014, 2015). Given that co-authored publications are often an outcome of partnerships or associated interactions, low levels of co-authored publications point to the low level of absorptive capacity of Latvian enterprises (OECD, 2013). Although private sector's R&D expenditure overall has increased since 2000, the amount of investments has been fluctuating (showing a significant decline from 2006) and remains very low, especially when compared to the more advanced EU countries. This suggests that the rate of cooperation and absorptive capacity needs to be improved in order to integrate state-of-the-art knowledge and technology in the companies' operations.

The economic development so far has been based on low labour costs and low tech industries, while absorptive capacity of industry has not increased

significantly (Arnold et al., 2014; Klāsons & Spuriņš, 2015). Arnold et al. (2014) also pointed out that the cluster formation in Latvia is weak and that does not encourage sharing of expertise and infrastructure among the companies, hindering ability to innovate and absorb innovation and build advantages of specialization. The majority of companies in Latvia are small and medium sized enterprises (most of which are effectively micro-enterprises or self-employed people) with limited financial and human resources for innovation that limits the capability to acquire knowledge and technology from R&D institutions and there also seems to be insufficient motivation for that.

As Rodriquez-Pose (2001) argued, in the less developed regions it is prevalence of SMEs, limited supply of skilled workforce, as well as relatively low levels of entrepreneurship that hinder practical application of academic research results, thus constraining the possible positive effects of public investment in research on innovation and economic development.

Additionally, the Commission Country Report (European Commission, 1999)suggested that Latvian companies might face additional challenges due to uneven distribution of research infrastructure in regions as most of it is concentrated in the capital city Riga. A more recent study on business activity in different regions in Latvia (Klāsons & Spuriņš, 2015) argued that only 4% of the companies would consider changing their location to be in closer proximity of R&D infrastructure, thus suggesting that they are not oriented towards technological innovation or interested in collaboration with research organisations.

According to a survey carried out by the Central Statistical Bureau of Latvia (CSB, 2014), while majority of innovative companies have developed technological innovations, most of the funds are directed to infrastructure improvements - almost 94% of expenditure went to acquisition of modern equipment or software in 2012. Only 1% of total innovation expenditure was directed to R&D outsourcing, and 3% to in-house R&D activities. In addition, the results of the survey show that only every fourth company cooperated with someone else in innovation activities - the cooperation partners were most likely other companies or providers of components, softwareetc., while the least likely partner was higher education or research institutions. Despite investments, most of the companies, with a few exceptions still rely on outdated infrastructure and equipment, which makes investment in infrastructure paramount to retain competitiveness in the export markets. This pattern of investment and collaboration also suggests that the dominant pattern of innovation in Latvian companies is process innovation. As process innovation is learning-by-doing, using and interacting (DUI) type rather than science and technology-based innovation, formal technology transfer through acquisition of patents, etc. is suitable only for a small number of companies that operate in knowledge intensive sectors such as IT, electronics and pharmaceuticals, while for the rest of the economy it has little to offer.

Central Statistical Bureau of Latvia (CSB, 2015) identified 411 companies engaged in R&D in 2014, while the amount or R&D workers was 1382 – 776 R&D

personnel (researchers) in full time equivalent, 606 other R&D staff (technicians and equivalent staff and research supporting staff). Although the number has increased significantly comparing to 2013, the proportion of R&D workers in the business sector is very low and the data still suggests problems with human resources and a shortage in human resources skilled in areas important for technological innovation - possible reason for low innovation absorption capacity.

However, the data on company R&D performance and staff might be imprecise and might be misleading and showing a more optimistic picture, but, as we can see now, not accounting for some innovation. After all the labor force has been declining, while the GDP has been growing since 2010, which means that there are at least some innovations, if not technological, then some process/managerial, taking place. The reason for this is the reporting on company innovation activities that has been rather poor until very recently – when the R&D tax incentive was introduced – there was no formal incentive for most companies to account for R&D and report it. The only exception might be companies with significant share of foreign capital, where accounting standards are higher and therefore also R&D expenditure is also accounted for.

2.3. Governance of research and innovation policy

Meanwhile the science sector is highly dependent on EU funding (that has to a large extent replaced state funding) and therefore has focused its efforts on activities aimed as acquiring research funding and not necessarily addressing market demands. R&D institutions are fragmented and that has negatively affected the distribution of funding. Additional challenge for bringing this fragmented system together is the fragmentation of innovation policy making and implementation across a number of organisations, which is further exacerbated by weak coordination between ministries and in general weak and fragmented governance structures for research and innovation.

The Law on Scientific Activity determines that the Cabinet of Ministers sets the policy for science and technology, however the Cabinet is only involved as the formal decision making body. The Latvian Strategic Council for Research and Innovation, a collegial body under the cabinet created to facilitate cross-sectoral coordination in research and innovation policy, so far has not been effective in providing strategic guidance, as it failed to attract political decision makers. The Latvian Council of Science, whose role in the early transition years was more significant and was that of an advisory body, has in the recent years become more of a funding agency under the Ministry of Education and Science (further - MoES). MoES, on the other hand, has gained a very significant role as the developer and coordinator of science and technology policy since the Academy of Sciences lost its position as a policy making body (Rambaka, 2012). Innovation policy, however, is the responsibility of MoE with its own funding agency - Investment and Development Agency of Latvia (further - LIAA). Both

LIAA and the Latvian Council of Science have not been established as agencies for funding innovation and research, but have instead evolved to fulfil this role(E. Arnold et al., 2014; Rambaka, 2012). However, these are not the only organisations involved in funding R&D or innovation - the State Education Development Agency (under supervision of MoES) is responsible for distributing and supervising funding allocated from ESIF to basic and applied research. Meanwhile a number of smaller organisations are in charge of managing financial instruments to support innovation and entrepreneurship.

As noted above, research an innovation policy relies on horizontal instruments and has not sufficiently helped in focusing research, bridging science and industry, commercialising research outputs from research institutions. Fragmentation of innovation and research policy making and implementation, especially given the limited capacity and capabilities of individual organisations involved, as well as lack of priorities further exacerbate the already apparent inefficiencies.

3. INCENTIVES FOR STRENGTHENING SCIENCE-INDUSTRY LINKAGES

Objectives and instruments of R&D and innovation policy are outlined in two documents - Science, Technology Development and Innovation Guidelines 2014-2020 (MoES, 2013) and Guidelines on National Industrial Policy for 2014-2020 (NIP). This yet again points to fragmentation in R&D and innovation policy making, as STDI Guidelines were developed by the MoES, while NIP was developed by the MoE. NIP focuses on promotion of innovation e.g. improving knowledge capacity, innovation supply, innovation demand, and the technology transfer system. Meanwhile, STDI Guidelines focus on national goals and priorities for science, technology and innovation and is a part of a strategy for smart specialization, as well as promotes fulfilment of the objectives defined in national long-term and medium-term policy planning documents (MoES, 2013). Funding of policy instruments included in the STDI is administered by 3 different organisations - the Study and Science Administration (SSA), State Education Development Agency (SEDA) and the Latvian Science Council (LSC) (ibid.).

Given that innovation policy planning is directly linked to EU 7-year financial planning periods, all measures outlined in the policy documents for the current period haven't yet been launched. In this paper we therefore focus on a set of instruments that were available during the previous planning period - 2007-2013. During this period the MoES was responsible for instruments that provided funding for R&D, while MoE was responsible for instruments aimed at supporting entrepreneurship and innovation.

Two types of support programs can be identified in Latvia, that focus on supporting science-industry collaboration. First, there are incentives that aim to

strengthen the capabilities to commercialise research via structural reforms in research institutions. Second, there are incentives that support applied research projects focused on industrial application and where commercialisation of research could be a possible outcome. Some of the funding for R&D was coming from state budget, but most instruments were funded by the ESIF. The scarcity of state funding prevents implementation of internal motivational instruments thus technology transfer is largely supported by external activities.

To improve the conditions, universities and research institutions programmes like the technology transfer office (hereafter – TTO) programme have been implemented. The aim of the programme was to identify projects with an international commercialisation potential within the research organisations, provide support for securing intellectual property rights, provide consultations for both researchers and companies and provide support in technology transfer. Initially more activities were planned such as establishment of an overarching technology transfer centre that could identify projects with commercial potential in other organisations as well, would look over the unified IP portfolio of the smaller TTOs and would be as a contact point in international licencing cases, however, the economic crisis impacted the programme and it was decided to maintain the support only to the TTOs already established within research organisations.

TTOs are seen by most policy makers as the centre and primary driver of commercialisation efforts, however, as is pointed out in some studies (Grimaldi et al., 2011; OECD, 2013), only a few top universities and research institutions across the world have meaningful income from formal commercialisation of research. Therefore, one could argue, that the main objective of policy makers when developing policy measures aimed at strengthening formal technology transfer is not to improve innovation performance, but to improve the country's position in the Innovation Union scoreboard by improving performance in terms of specific indicators where country's performance is the weakest. As a result, focus is more on the formal performance indicatorsand not on the real impact on innovation performance in enterprises. Bozeman (2000) describes this as the "Out-the-Door" criterion - organisations respond to external pressure by focusing on the number of deliverables such as cases of technology transfer while the impact of these cases is rarely considered. One of the reason is improvement of statistics that in return improve researchers' chances of acquiring funds while in reality the license agreements have no significant financial value.

An evaluation was done on the results of the TTO programme by the MoE (2016) and the review of their activities showed that while many of the quantitative indicators (national patent applications, revenue of the TTO, contract research) were even overachieved, they had insignificant impact on the economy. During the programme there were 7 cases of sale or licensing of technologies developed by the universities and 20 cases at the Art Academy of Latvia (sales of design projects) and none of them involved foreign companies. 13 spin-off companies were developed, on average around 1000 consultations to companies

or individuals were given annually. The review of the activities also states that TTOs were offering an important support for writing patent applications -while the activities and their results are important and needed, they have not visibly improved science-industry collaboration significantly in terms of technology transfer and joint ventures. Additionally, it is interesting to add that funding was distributed equally among TTOs, disregarding the type and capacity of the institutions, as well as their performance which is not motivating for the TTOs to achieve better results (MoE, 2016).

Similarly, strong emphasis is put on university patenting while university patenting just for the sake of patenting to improve statistics, should be critically evaluated, as already scarce funding goes towards patent maintenance fees, while most of these patents are likely never to be licensed at all.

Figure 3 shows that the number of patent applications originating from Latvia has increased since the 90s reaching 305 patent applications by its residents, 8 by foreign applicants and 174 applications by this country's resident at a foreign office.

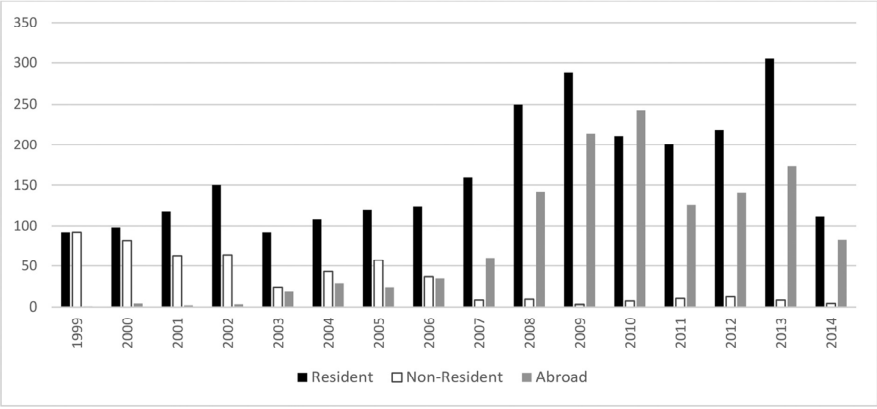

Figure 3 Patent applications from Latvia, 1999 - 2014

Source: WIPO statistics database(WIPO, 2016)

The sharp decline in non-resident filing might indicate the lack of interest in Latvian market, while patenting abroad suggests that local companies are seeking opportunities in foreign markets. However, it might also be misleading – as discussed above, ESIF stimulated patent applications and the years showing a significant increase match the years were patents were filed to satisfy the requirements for EU funded projects. Therefore, it does not necessarily indicate improvement. Even more - license and patent revenues from abroad have in the recent years been declining (European Commission, 2014, 2015).

Figure 4 shows the top fields where patent applications are filed. The largest amount of patents is filed within the pharmaceutical, organic fine

chemistry and food chemistry which is not very surprising, taking into account the economic structure in Latvia.

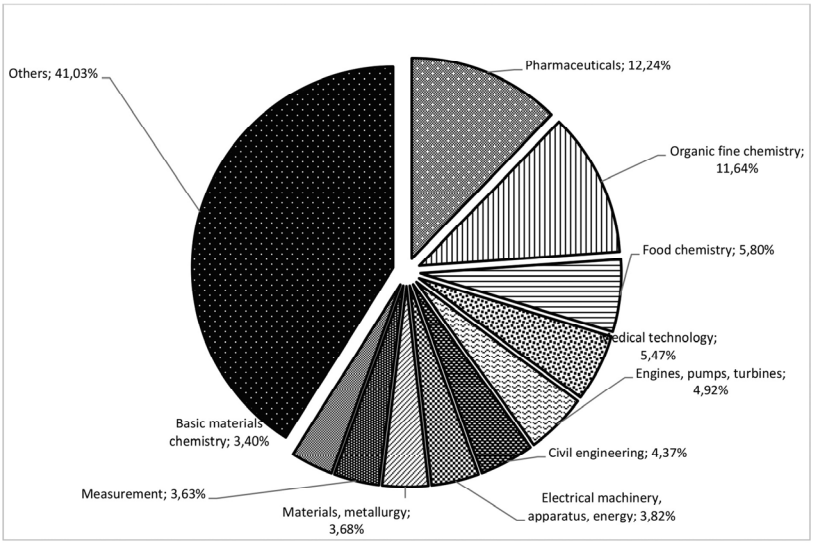

Figure 4 Patent Applications in Latvia, 2000 - 2014

Source: WIPO statistics database (WIPO, 2016)

The number of PCT applications has been steadily increasing since 2000, however, the numbers are relatively low (Figure 5).

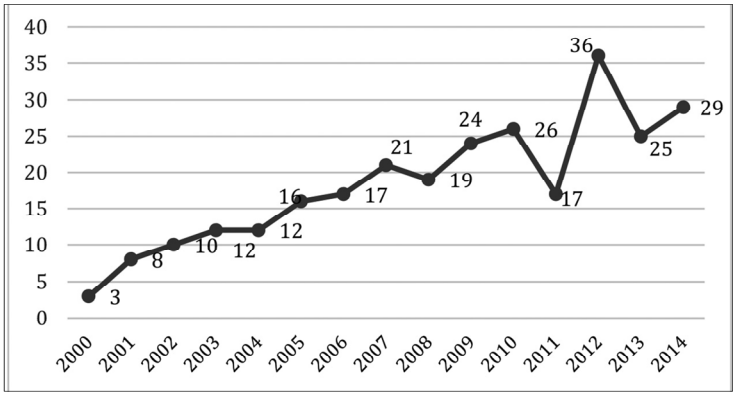

Figure 5 PCT Applications from Latvia, 2000 - 2014

Source: WIPO statistics database(WIPO, 2016)

The top PCT applicants from Latvia are "Grindeks" – the largest domestic pharmaceutical company, Latvian Institute of Organic Synthesis working mostly on drug discovery and development, and Ventspils University College. While pharmaceuticals is the field where the most patent applications are filed, the companies in Latvia are focusing mostly on producing generic rather than original drugs.

When it comes to granted patents, data available on WIPO statistics page, shows that the overall amount has significantly increased since the first half of the 2000s, especially those granted abroad.

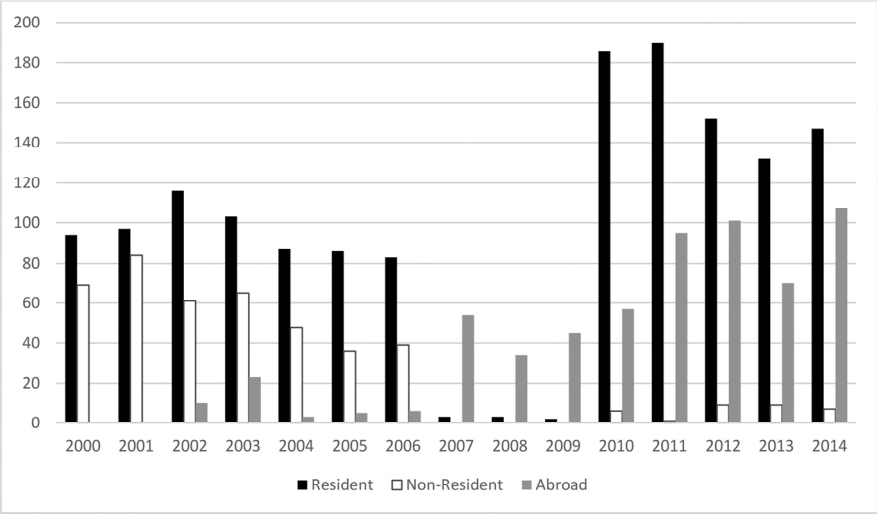

Figure 6 Patents granted, 2000 - 2014

Source: WIPO statistics database (WIPO, 2016)

This increase can be explained by the administrative and financial support from the TTOs and other incentives funded by ESIF. However, as mentioned previously, revenues from licensing are declining and many of the granted patents have found no use for the industry.

Along with formal technology transfer by licensing, there are other mechanisms that universities and research institutions could use, such as academic spin-offs, collaborative research, contract research and consulting, as well as ad-hoc advice and networking with practitioners (Grimaldi et al., 2011). The more informal mechanisms of technology transfer are particularly relevant in economies with process-focused DUI mode of innovation. However, it seems that the Latvian government is more concentrating on supporting formal ways of technology transfer such as contract research and licensing.

The government is pressured to implement these incentives to meet the overall targets of the EU and success stories in other countries are being used as examples. However, the environment for technology transfer varies, therefore doing so might lead to different outcomes than expected by the policy-makers (Grimaldi et al., 2011). According to the OECD (2013), relative performance on many occasions is measured against US institutions that are widely considered to lead in terms of commercialisation outputs, however, as already discussed previously, this approach is not suitable for countries like Latvia. One of the reasons is the structure of businesses in Latvia –the needs of small and medium sized enterprises in traditional sectors often don't match with what researchers can offer. For example, many research projects in Latvia are related to key enabling technologies (such as micro and nanoelectronics, nanotechnology, industrial biotechnology, advanced, materials, photonics, and advanced manufacturing technologies) because it gives better opportunities to acquire funding, however, these technologies are often too advanced and too far from the market to be utilised even by the local industry that represent the same field. Therefore, research groups later struggle to commercialise the outputs because there are no potential users among the local companies and infrastructure for technology with a higher readiness level e.g. technology development centres, incubators, parks, prototyping laboratories and experimental plants is not sufficiently developed (MoES, 2013).

Another problem is that the complexity of the rules and regulation of ESIF funded projects and scarce budget make the beneficiaries very cautious in implementation. Therefore, research institutions seem to pay more attention to compliance with regulations rather than to concentrating on societal impact that their results could make. Although the programmes are offering new possibilities, such as the applied research projects, useful tools are overcomplicated thus reducing the positive impact they might have had. Therefore, less complicated implementation rules might encourage not only application for support but also exploitation of the results.

While a second set of instruments helps in bringing new and better qualified human resources into companies(e.g. by raising the competences of researchers and encouraging students to purse this kind of studies), there are no instruments supporting company-subsidised research positions at universities and research institutes (MoES, 2013), as for example industrial PhD fellowships in Denmark or Sweden. That kind of collaboration would be beneficial for both and could stimulate further cooperation in other ways as well.

4. POLICIES SOLVING PROBLEMS THAT DON'T EXIST?

One could argue that throughout the last 15 years, Latvian decision makers have been copying policy instruments from more successful countries, assuming that those will ultimately improve Latvia's innovation performance. There were, however, a number of flaws in the process that did not and still, in our view, do not allow to reap maximum benefits from public sector interventions.

First, not enough attention has been paid to research and evaluation of the systemic and market failures retarding innovation and development in Latvia. Data collection on innovation activities of enterprises in Latvia has so far been limited to only a few key indicators necessary for fulfilling the EU requirements and no local initiatives to improve data collection have been introduced. Besides, collection of statistical data on innovation has not been followed by effective communication towards businesses regarding the needs for collection of these data, which ultimately negatively affects both the response rates as well as quality of data collected. With the introduction of tax subsidies for R&D spending, one could hope that at least collection of data on R&D spending will improve. However, given that Latvian enterprises are mostly engaged in the DUI type of innovation activities, most of innovative activities will still not appear in statistical reports. Lack of data undermines any efforts to evaluate gaps in the innovation system that need to be addressed via policy instruments. Therefore, if this will not be addressed, policy makers in Latvia will continue looking for the proverbial keys where there is light, and not where the keys are.

Second, as argued elsewhere (e.g. Erik Arnold, Arnulf, Jacobsson, Romanainen, & Smith, 2010; Cepilovs, 2014), there is a general lack of capacity and capabilities in the public sector, necessary to plan, design and implement effective policy instruments. This is further exacerbated by high rates of turnover of civil servants, reaching up to 20 per cent per year (LETA, 2015). Weak capabilities and lacking capacity across the policy cycle lead to a situation where policy instruments are proposed on the basis of results of external benchmarking activities (for example, IUS), as well as best practices from more successful countries. This is not to argue that benchmarking exercises, such as IUS, are not useful or relevant, but should not substitute policy relevant research that feeds into policy practice. Normally such benchmarking exercises utilise a range of indicators that are universally applied across countries, disregarding the specificities of local environment. In case of Latvia, however, performance in a narrow range of indicators from IUS (e.g. R&D spending, PhD graduates, patenting), has served as a reference point for development of a policy mix that has been utilised to support innovation over the last decade, with very minor adjustments. This lead to a situation where solutions were chasing problems (as in Béland & Howlett, 2015).

Third, as already argued above, institutional developments that have taken place over the last 25 years, lead to a situation where science and research system has evolved in such a way as to detach itself almost entirely from the needs of domestic industry. While at the same time, given the effects of economic transition, local industry developed following a pattern persistent in many developing economies suffering from middle-income trap – relying on labour cost and not technology as a source of competitive advantage (Griffith, 2011). Reliance on low labour costs, resulted in low level of technological development across all major industries and therefore also low level of absorptive capacity necessary for utilisation of research output.

We argue that besides strengthening the capacity of existing companies by building the competences of human resources and improving infrastructure, additional efforts should be made to support the creation of internationally oriented technology start-ups (that might be spin-offs from universities) and facilitating the interest of cooperation between sectors, not only by reminding the opportunities that innovation brings but also the dangers of not moving forwards.

5. CONCLUSIONS

A substantial mismatch between the existing policy problems and applied policy instruments exists. As a result of this mismatch, most of the policy instruments used to support innovation, and especially so those related to industry-science collaboration and technology transfer through technology licensing, have been ineffective and failed to achieve the economic effects. The only objectives that could be reached if such approach to policy making is maintained further is improving Latvia's position in the Innovation Union Scoreboard. However, this, in our view, is not likely to result in technological upgrading and increased competitiveness of local industry; neither will it lead to sustainable positive outcomes for Latvian economy, which, in our view, is the ultimate objective of public policy.

Latvian policy makers are mainly applying the "Out-the-door" criterion when developing support incentives - the results of research that is funded by public money are predefined and motivates to just deliver the numbers instead of creating the most impact as it is not relevant for receiving the funds. What matters is the number of outputs written in the proposals, e.g. license agreements, patent applications, publications. Higher possible revenue or value of the outcomes is relatively irrelevant or even unwanted as that might cause bureaucratic procedures. Due to the low amount of funding the motivation of researchers tends to be related to being able to survive instead of creating an impact on the market.

As a result, universities and other research organisations have so far focused on reaching the planned goals instead of motivating and creating entrepreneurial spirit among research groups. Incentives within universities should be implemented more to motivate researchers and students into solving

existing problems for the local market or encourage them to go international. Thus more funding for business incubators for technology-intensive companies should be planned together with university funded motivational incentives. Besides, more flexible understanding of technology transfer, including informal technology transfer through, for example, temporary employment of researchers by companies, should be encouraged. This, in combination with suitable financial incentives, could encourage creation of denser collaboration networks between industry and research institutions, potentially improving absorptive capacity of the former.

In addition, to avoid unnecessary loss of funds, the requirements of the support incentives should be balanced with the time span and tailored according to the planned outputs, e.g. if a publicly tendered licence agreement is required at the end of the protect it should apply only to projects that are working on technologies with a higher technology readiness level (TRL) and that are e.g. patentable. A large part of research conducted in universities results in know-how and thus this kind of approach with licensing is not appropriate and often further work to ensure the sustainability and continuity of the research should be done. The current approach has created a number of useless patents and caused problems with licensing the know-how – universities have developed commercially viable know-how that has potential but still needs further work and companies are not willing to obtain the licences as for them it is too far from the market to be interesting. Many companies are also driven away by the public tender requirement as it causes issues with confidentiality. A better approach would be to offer funding in steps and to carefully determine the outcomes and TRL for each step.

Governments use quantitative data on transfer cases or patent applications as indicators of how the national innovation system is improving and therefore applying this criterion is rather convenient. The increasing focus on various scoreboards and benchmarking is promoting this kind of approach in countries with a poor innovation performance. Meanwhile there are incentives like funding to establish collaboration platforms that instead does not focus on quantitative results but rather on continuous collaboration that expands beyond the initial aim, e.g. information exchange platforms that expand into consortiums engaged in informal technology transfer activities.

Tech transfer activities of universities rarely go beyond consultations and occasional contract research or joint projects funded by the ESIF - licensing and creation of spin-offs is rare. It is important to introduce new internal incentives at universities to promote entrepreneurial spirit among researchers and raise the awareness of the benefits of technology transfer. Some universities have already developed programmes that award researcher if they bring in a company or develop a commercially viable product, however, the impact of these activities is yet to be seen.

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POTPORA TRANSFERU TEHNOLOGIJE NA SVEUČILIŠTIMA – BORBA S PREPREKAMA U LATVIJI

Sažetak

Europske zemlje u okviru različitih razvojnih strategija već dulje vrijeme imaju cilj unaprjeđivanja suradnje između znanosti i industrije u svrhu jačanja svojih inovacijskih učinaka, dok je niz poticaja usmjeren na elemente nacionalnih inovacijskih sustava kako bi se olakšao transfer tehnologije na sveučilištima. Cilj ovog rada je raspraviti ove poticaje u Latviji – maloj tranzicijskoj zemlji s relativno skromnim inovacijskim učinkom i pod pritiskom oblikovanja svoje industrijske i istraživačke politike u smjeru industrijskog razvoja i održivog rasta. Latvija je zemlja koja se još uvijek oporavlja od nedavne financijske krize i pokušava nadići problem iz prošlosti kad je bila dio Sovjetskog saveza (pozadina koja ima specifične karakteristike okoline u kojoj istraživači i tvrtke rade). Rad se usredotočuje na odabranu grupu politika i poticaja koji povezuju znanost i industriju u Latviji i način na koji se to uklapa u ekonomsku strukturu. Polazi se od pretpostavke da odabrani pristup (koji je često inspiriran pričama o uspjehu u inozemstvu) nije uspješan i dovodi do neslaganja ove dvije domene, te usporava napredovanje jer se ne bavi uzrocima slabe suradnje, poput niskog kapaciteta za apsorpciju inovacija u poslovnom sektoru koji bitno utječe na proces transfera tehnologije. Umjesto toga, ublažava simptome, npr. niske izdatke za istraživanje i razvoj (R&D). Istraživanje je provedeno kao analiza slučaja (case study) koja se oslanja na podatke prikupljene istraživanjem pisane dokumentacije i razgovorom s ključnim kreatorima politike.

Ključne riječi: Transfer tehnologije na sveučilištu, istraživačka i industrijska politika, apsorpcija inovacija, prijenos politike, propast politike

JEL klasifikacija: O380 Technological Change: Government