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NEW EUROPE'S PROMISE FOR LIFE SCIENCES

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Abstract

The life sciences sector (and biotechnology in particular) has emerged as a prospective area, and attracted a lot of attention recently. Multinational companies in the life sciences seek to explore new markets, and, on the other side, governments strive to develop the life sciences sector perceiving it as a basis for long-term development. Whilst the R&D activities of global multinationals in life sciences still remain concentrated in the Triadic economies, these companies increasingly seek for new location to tap the knowledge. New EU member states emerge as such prospective locations. Notwithstanding the interest towards this sector, the body of literature on the development of life sciences in new EU member states, and particularly, the role of multinational companies, remains scant. In this explorative study we attempt to fill this gap and focus on the role of multinational companies in the Czech life sciences sector.

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1 Introduction

The life science industry is having a significant impact on the health of population and the wealth of nations, and has attracted a lot of attention recently. Growth in the life sciences is fuelled primarily by the disruptive and creative nature of biotechnology. It is similar to the changes provoked by the technological revolution that information and communication technologies (ICT) provoked in the recent past. There are profound differences though. Because governmental regulations did not play a crucial role for ICT, the major players in the sector were start-up firms and small and medium-sized enterprises in general, in the life sciences sector the situation is different (Luukkonen and Palmberg, 2007). The sector falls under a tight control of national medicine regulatory bodies, characterised by high upfront R&D investment and long development times. Thus, in most cases only multinational companies possessing enough capital and facilities, and able to comply with regulations can operate in the sector; and small companies tailor their strategies to cooperate with them.

Not only in life sciences, but in most other industries too, multinational companies are playing an ever increasing role in global economy, and not only in the production of goods and delivery of services, but also in conducting research and development (R&D) on a global scale. Already in the mid-1990s, multinationals accounted for a large share in the R&D expenditures of the Triad economies (Gassmann and von Zedtwitz, 1999). In 2002, measured in terms of R&D expenditures, the 69% of world's business R&D was undertaken by the 700 largest R&D spending firms of the world – of which at least 98% were multinational companies (UNCTAD, 2005). Traditionally, multinationals retained their R&D functions at the headquarters; unlike other largely internationalised functions. A recent trend, however, is the internationalisation of R&D (Granstrand *et al.*, 1993; Kuemmerle, 1997; 1999), stimulated by various factors, such as changing technologies and shorter product life cycles in the global economy. Multinationals feel the pressure to invest more in R&D to succeed on the market. This imperative, coupled with a shortage of skilled labour (and its rising cost) in their home bases, lead multinational companies to adopt global R&D strategies.

The superiority of the Triad as a location for R&D is challenged by emerging economies. Although the bulk of foreign R&D activities of multinationals are still taking place in developed economies, recently R&D expenditures have grown fast in emerging economies (UNCTAD, 2005). Therefore the internationalisation of corporate R&D, coupled by dynamic growth in non-Triad regions, has changed the global landscape for R&D. Countries of Central and Eastern Europe, the new member states of the European Union (EU), are emerging as prospective locations for foreign investors too, and not only for

manufacturing, but also for higher-value added corporate activities, such as R&D. Historically, their science and technology systems were well developed and presently they attempt to strengthen their R&D capacities by various measures, including attracting foreign investment in R&D. It is estimated that business enterprise R&D in the ten new EU members rose from USD 688 million in 1991 to USD 1452 million in 2003 (UNCTAD, 2005: 287).

Following these developments, the focus of this chapter is placed on the intersection of the sectoral view on the life sciences, with a special interest in foreign direct investment (FDI) in R&D. We analyse multinational subsidiaries in the Czech life sciences sector. There is a well-established body of literature that deals with the multinationals' entry mode into a host economy, rooted in the pioneering study by Stopford and Wells (1972). Studies on subsidiaries are relatively new strand of literature that has burgeoned considerably over the recent decennia (Paterson and Brock, 2002), with the subsidiary evolution as a vital research issue (Birkinshaw, 1996; Birkinshaw and Hood, 1998).

While insights from the aforementioned international business theory are helpful for the present study, the chapter seeks to contribute to other research area, namely academic literature on transformations in the CEE region and EU enlargement. Notwithstanding the abundance of literature on the economic transition (Knell, 1992, 1996; Scholtès, 1996, Campos and Coricelli, 2002) and the role of FDI in transition (Estrin *et al.*, 1997; Meyer, 1998), studies investigating knowledge-based activities in CEE economies remain scant (Pech and Radosevic, 2006). Developments of life sciences sector (and biotechnology in particular) in CEE, the knowledge-based industry of the 21st century, remains largely under-researched topic, at best represented by studies on clinical trials (Pal, 1997; Natorff, 1998; Babic and Kucerova, 2003). Despite seemingly widespread interest in the implication of the 2004 EU enlargement, focus of many economic studies is still placed on "old" member states, EU-15. Despite some exception (Sansom, 1999; Damborský *et al.*, 2006), most studies in life sciences tend to focus on EU-15 (Reiss *et al.*, 2004; Mangematin, 2004).

The chapter is an explorative study that seeks to fill this gap in the literature by employing qualitative analysis and investigating operations of several multinationals in the life sciences in the Czech Republic, one of the regional leaders. Focusing on only one country allows us to have a deeper and more detailed look, yet since many features of the Czech life sciences sector are common to other countries in the CEE region, the research is relevant for them too.

The chapter is structured as follows. Section 2 sets the stage by providing insights into the life sciences sector. Section 3 presents a qualitative analysis of strategies and operations of

subsidiaries in the life sciences sector of the Czech Republic. Section 4 concludes and provides policy implications.

2 Life Sciences

Life sciences are a global innovative industry, widely regarded as one of the most promising frontier technologies for the coming decades. It has recently attracted increasing attention as an important tool that has transformed the route for new drug discoveries and deliveries and can in general improve the quality of life. Life sciences may be broadly defined as including the scientific discipline of life and of living organisms. The term is used as a collective name for the pharmaceutical and biotechnology industries as well as medical technologies, clustered together due to their interdependence and fuzzy borders between them. The interdependence between pharmaceuticals and biotechnology emerged in the second half of the 1970s when several pharmaceutical multinationals started partnering with biotechnological start-ups to gain knowledge (Roijsackers and Hagedoorn, 2006). Most biotechnology companies are small, they account for the bulk of innovative activity and the business model is based on commercialisation of university research that may lead to major scientific and technological changes; in most cases, this commercialisation depends mainly on the efforts of large (multinational) companies (Kenney, 1986; Powell, 1996; McKelvey, 1996). By now collaboration in R&D between pharmaceutical multinationals and biotechnology companies has increased dramatically (Roijsackers and Hagedoorn, 2006). Moreover, pharmaceutical multinationals not only engage in partnering with biotechnology start-ups, but they also acquire them, as a way to withstand competitive pressure from generic drugs companies.

Different typologies have been designed to study the R&D-intensity of industries (for example, UNCTAD, 2005: 108). According to the UK Department of Trade and Industry, pharmaceuticals and health is the first and the most R&D-intensive group out of five groups (DTI, 2006). It consists of pharmaceuticals & biotechnology (R&D-intensity: 14.9%) and health care equipment & services (R&D-intensity: 6.4%), where R&D-intensity is defined as direct R&D expenditures as a percentage of production (gross output). Moreover, the global sector is characterised the growth of R&D expenditures which is induced by a number of factors, such as ageing of population in developed countries and market growth in developing ones. As for the biotechnology, it is a relatively young industry, but it has shown an impressive and effective development over the past years, pushing the boundaries of conventional medicine into the fields of genomics, molecular biology, bio-medicine, bio-informatics, etc.

The high level of R&D-intensity of the life sciences sector implies that linkages between corporate R&D activities (including research and clinical trial) and host-country

science/research systems are very important. In other words, strong links between public sector and industry are crucial for commercialisation of products (Meyer-Krahmer and Reger, 1999).

The life sciences sector is heavily concentrated in the leading spots of the Triad, with the US taking the lead and surpassing Europe in the amount of R&D investment and production. The global life sciences sector is set to grow, which in turn forces multinationals to search for new cost-effective locations to remain competitive. Owing to the increasing demand for innovative drugs and an increasing patient base, CEE economies have a good potential. The geographical proximity to advanced Western European markets is a key advantage. Moreover, the CEE economies have a reasonable environment for knowledge-based activities of multinational companies and development of life sciences industry in particular, owing to a relatively strong scientific and technological base and a critical mass of skilled human resources.

The 2004 accession to the EU is a major factor in the development of the sector. Joining the European common market implies that a product developed and manufactured in any member state can be sold across the Union. Apart from the classic benefits of regional economic integration for multinationals in terms of enlarged market, the Union is set to play a decisive role in promoting knowledge-based economy and in the life sciences specifically. For example, in January 2002, the European Commission adopted a Strategy for Europe on Life Sciences and Biotechnology”, which proposes a comprehensive roadmap of policy orientations and an action plan up to 2010.

Many governments in the region have realised the potential of the sector and design and implement respective public policies (BioPolis Report, 2007). In the process of transition the sector was largely neglected; and only recently governments in region declared the sector a priority. The biggest challenge inherited from the past is a separation between academic research and industry; not all CEE countries have made progress in this area (BioPolis Report, 2007).

The pharmaceutical market in the CEE countries is relatively small in comparison to the Western Europe or the US. In 2006 it was estimated at USD 9.2 billion, and it is expected to reach around USD 14 billion by 2010, still being around 5% of global pharmaceuticals (Miriya, 2007). Although domestic pharmaceutical and biotechnology companies are active in the life sciences sector in CEE countries, it is characterised by the strong presence of subsidiaries of multinational companies, which have been a driving force behind the growth in the sector.

Academic literature has extensively investigated drivers of FDI and has distinguished its four main motives (Dunning, 1993). Three of them (market-seeking, efficiency-seeking, strategic asset-seeking) help explain investment behaviour of multinationals in the CEE life sciences sector.

Market-seeking FDI implies that a multinational company establishes its subsidiary to serve a host-country market. In the CEE region, market-seeking FDI is motivated by rapid economic growth and a largely under-served population. Increased demand from both public and private healthcare is to lead to growth in sales of both branded and generic drugs, although generics dominate over the brands due to a lower purchasing power than in the West. Moreover, since the CEE economies became part of the regional bloc, the EU, non-EU investors are attracted by the magnitude of the Single European market.

Efficiency-seeking FDI is carried out with the purposes of restructuring existing production through rationalisation and locating some parts of the value chain in places which provide lower costs. In the CEE countries, efficiency-seeking FDI is attracted by the low cost of manufacturing, and primarily, low cost of labour. Additionally, the search for cost-effective locations is driven by the increasing R&D costs that pharmaceutical and biotechnology multinationals have to bear.

This search for cost-effective destinations for R&D corresponds to the type of the asset-seeking FDI, investments in strategic assets (human capital, technology, etc). The CEE countries have a strong technological legacy; multinationals are attracted by the presence of universities and research institutes involved in life sciences. Although, performance of the CEE countries in terms of attracting FDI in path-breaking research is very moderate, since mid-1990s they have emerging as advantageous locations for clinical trial. The decisive factors have been availability of homogenous, drug-naive patient base, the high treatment compliance rates of patients and high ratio of doctors per capita of population. As the clinical trials must comply with the EU regulations, more multinational pharmaceutical companies are focussing on the new EU member states, which offer excellent location for such clinical development activities (Pal, 1997; Natorff, 1998; Babic and Kucerova, 2003). The quantity of research conducted in these countries is increasing. The three largest new EU member states – Czech Republic, Hungary and Poland – host up to 1000 studies annually. New EU member states have lower clinical development costs and less regulation as opposed to traditional locations in Western Europe. The governments of new EU member states have incorporated the European legislation into national law before the accession to the Union, including Directive 65/65/EEC, the first and fundamental pharmaceutical framework directive in the EU, and Directive 2001/20/EC on the clinical trials.

Undoubtedly, the CEE region is not a homogenous block. BioPolis Report (2007) groups new EU member states in three clusters based on the degree of advances in the life sciences. Cluster 1 includes the countries closing the gap with the EU-27 (Czech Republic, Estonia, Hungary and Slovenia). Cluster 2 consists of countries making progress (Poland and Slovakia) and finally, Cluster 3 unites weak performers (Bulgaria, Latvia, Lithuania and Romania).

Czech Republic, belonging to Cluster 1, emerged as a dynamic economy. During the transformation period, the country has greatly benefited from a large amount of FDI, having recorded one of the highest FDI stock per capita in the region. The FDI flow has been stimulated by the introduction of a transparent system of investment incentives in 1998. CzechInvest, the Czech national investment agency, has identified nine key investment areas, including life sciences and medical devices and R&D. Within R&D, six priority areas are defined, including molecular biology, biomedicine and biotechnologies, as well as development of new materials meant to advance life sciences. Pharmaceutical companies investing in production in the Czech Republic are eligible for corporate tax relief for up to ten years, job creation grants, training and retraining grants and site support. Subsidies to business activity and training and retraining are available for technology centres and applied R&D.

Essentially, three main groups of players can be identified in the Czech life sciences sector. These are research institutes and universities, domestic companies and subsidiaries of foreign multinational companies. According to the Czech Biotech Report (2007), at the beginning of 2007 there were 57 biotechnology companies and 308 biotechnology research entities in the country. A substantial number of the Czech biotech companies cooperate closely with big pharmaceutical players in the Czech market, operating as either a supplier base for pharmaceutical substances or conducting subsequent research and contractual work. US and European pharmaceutical multinational companies dominates the sector and their production is exported to other European markets and to the rest of the world.

In such a knowledge-intensive sector as life sciences, research institutes play a crucial role. The Czech Republic possesses a network of research institutes spread across the country. It is no coincidence that biotechnology clusters have emerged in the university cities. Brno, the second largest city in the Czech Republic, is becoming a hub of biotech companies. Gate2Biotech project developed by The South Moravian Innovation Centre, in partnership with CzechInvest, is a specialised biotechnology web-site which is to be the reference point for all the activities in the biotechnology sector.

Most of research institutes in the area of life sciences belong either to universities, to the Ministry of Health or the Academy of Sciences of the Czech Republic. The Academy of

Sciences is the national centre of non-university basic and applied research. It unites 53 institutes engaging in research in the natural, technical and social sciences and the humanities. There are three biomedical institutes of the Czech Academy of Sciences – Institute of Experimental Medicine, Institute of Physiology and Institute of Microbiology.

University professors and PhD researchers become increasingly involved in common research projects with industry. For instance, the University of Veterinary and Pharmaceutical Sciences in Brno is engaged in partnerships with companies, such as Zentiva and Spofa.

The International Clinical Research Centre is planned to become an important player in the sectoral innovation system of the Czech life sciences. This clinical-research-educational centre established in 2006 in Brno is a result of collaboration between Czech scientists and the Mayo Clinic, a US non-profit university hospital. The International Clinical Research Centre can be a platform for strengthening Euro-US collaboration in medical research and education. The project is valued at USD 100 million and around 250 researchers are employed. The technology parks provide infrastructure suitable for growth within the industry

Several institutions perform clinical testing of drugs. The State Institute for Drug Control in Prague is the highest authority supervising clinical trials. The company I.Q.A. founded as a spin-off from the Research Institute of Pharmacy and Biochemistry is engaged in preclinical and clinical testing of drugs. Other companies doing all phases of clinical trial are Zak-Pharma services (Brno), Cepha (Prague), Clinst (Prague), Pharm Test (Hradec Králové).

3. Multinational Companies in the Czech Life Sciences

Major US and European multinational companies are important players in the Czech economy and in the life sciences sector in particular. According to the OcoMonitor database, from 2003 till August 2007 alone, the Czech Republic recorded a total of 4 new investment projects in this sector, representing 17% of the CEE total (of 23 cases), compared to 9% for Poland, 17% for Russia and 22% for Hungary. The list of investors present in the Czech Republic include such names as Lonza (Switzerland), Arrow International (US), Amgen (US), Eisai (Japan), Molnlycke Health Care (Sweden), Covance (US), Olympus (Japan), Paul Hartmann (Germany), Synthon (The Netherlands), Johnson & Johnson (US). Moreover, many medical producers are present, *inter alia*, B Braun Medical

(Germany), Carl Zeiss (Germany), Axel Johnson International (Sweden), Philips Medical Systems (The Netherlands), Thermo LabSystems Corporation (USA).

In this section we look at several examples of multinationals entering the Czech life sciences sector, and draw conclusions on the basis of these observations. We proceed with the analysis taking an entry mode as a departure point. Essentially, there are two main modes of entry – greenfield investment and mergers and acquisitions. Greenfield FDI denotes investment projects entailing establishment of new production facilities. Whereas many multinational companies prefer greenfield investment, it is acquisitions that became the key mode of global FDI since the late 1980s, and they currently shape the global pattern of FDI activities (UNCTAD, 2000, 2006). The popularity is explained by the fact that it enables quick entry and facilitates access to local resources and networks. For the host country, the main difference between these two modes lies in the immediate of short-term effects (such as capital formation and employment generation) since in the long run the impact on the host country can be difficult to distinguish (UNCTAD, 2000, 2006).

The cases of acquisition were widespread during the transition period as foreign multinational companies acquired state-owned companies in a process of privatisation. Still, it is popular nowadays. Immunotech, a Czech company focused on R&D and the production of diagnostic kits for medical use, was acquired by the US company Beckman-Coulter, a leading producer of biomedical testing instrument systems. Immunotech itself was a subsidiary of the French company, and it was established on the basis of the Radioisotope Research and Application Institute in Prague.

Galena, one of the leading Czech pharmaceutical companies with 120-year history based in the city of Opava, was acquired in 1994 by the IVAX Corporation, headquartered in Miami, through a privatisation deal. The Czech Brno-based company Lachema began to focus on drugs at the end of the 1960s. In 1999 the Croatian multinational pharmaceutical company PLIVA acquired the majority of the shares of the company. At the end of 1999, PLIVA-Lachema was purchased by the US corporation Barr Pharmaceuticals.

Although the privatisation process ended mostly by the 2000s, an acquisition still remained a popular mode of entry. In 2002, Baxter Corporation, the global provider of medical products and services bought a site and unfinished building from SEVAC, a state-owned enterprise, initially established as the Institute of Sera and Vaccines. Since then, Baxter has invested around almost USD 56 million to develop the subsidiary, which now has around 200 employees. In 2003 the Dutch company Zentiva acquired two drug producers – Slovafarma in Slovakia and the Czech Léčiva. Zentiva's main shareholder is another multinational, France's Sanofi-Aventis.

Acquisition of manufacturing units has been an important mode of entry into a host economy for multinationals. In many cases an acquired enterprise contains technological capabilities, which can either be utilised by integrating into the new corporate network or downsized. The Czech company Galena acquired by IVAX retained its R&D department dedicated to biotechnology and remained embedded in the Czech national innovation system. It cooperates with national universities and research institutes in the development of active pharmaceutical ingredients.

Acquisition of stand-alone R&D units, such as research institutes in a host economy is a very specific case. In the centrally planned economic system, the organisational structure for research, development and innovation was highly fragmented. There was a traditional separation between a network of branch R&D, project design and product design organisation on one side, and a network of enterprises on the other (Hanson and Pavitt, 1987). This fragmentation was an obstacle for innovation, but could be managed by the central planning agencies. With the demise of the command economy, this traditional fragmentation led to unpredictable developments. Demand for R&D from manufacturing enterprises significantly decreased and many research institutes found themselves on the verge of bankruptcy. In the light of these developments, the decision made by the Czech government in the 1990s to privatise some research institutes is not surprising. It meant that state-owned research institutes were available for acquisition (not only for domestic, but for foreign investors, too). Acquisition of state-owned research institutes represents a typical case of asset-seeking FDI, attracted by strategic assets created by a host economy.

Multinational companies enter a host economy by acquiring R&D facilities, without prior experience in a host country and prior investment in less advanced corporate functions. The case of Lonza Group is illustrative in this respect. The Swiss chemical and biotechnology company, headquartered in Basel, is one of the world's leading suppliers to the pharmaceutical, healthcare and life science industries. As early as in 1991, the company began co-operation with Research Institute for Biofactors and Veterinary Drugs, and in 1992 it was acquired. A noteworthy observation is that the company entered the Czech market through acquisition of the most advanced corporate function (R&D). Later it progressed to more downstream functions, as a newly-established Lonza Biotec, a Czech subsidiary of the Group, started production of L-Carnitin. In 2002 Lonza began considerably expanding its facilities. Company's operations were expanded in 2004 (adding more downstream processing capacities). In 2005, the company decided to strengthen its R&D capabilities, and in 2006 a new R&D centre, worth of USD 18 million and employing 50 people, was opened in Kouřim.

It could have been assumed that potential for asset-seeking FDI in the Czech life sciences sector has been fully exhausted after privatisation / acquisition of state-owned research

institutes in the 1990s. Nowadays, it is private national R&D firms that remain the target for acquisition. For examples, in August 2007, the US-based international clinical trial company Medpace Inc. announced acquisition of the 500-employee Czech contract research organisation Monax. It is indicative that with this deal, Medpace aims to strengthen its presence in Europe, in addition to its existing offices in Belgium, Germany and the Netherlands.

In case of greenfield investment, a host country should be able to outcompete alternative locations short-listed by a multinational company in terms of package of investment incentives, provision of infrastructure and facilitation of entry. Laminar Medica is illustrative in this respect. The company headquartered in Tring (UK) specialises in design, test, manufacture and validation of transport systems for healthcare facilities. It has a warehouse facility in Germany and a manufacturing plant in the Czech Republic. The plant that became operational in 2005 as a result of a greenfield investment project. In 2003 the company started looking for a new location in Eastern Europe to match the demand of an expanding consumer base, while taking into account lower costs of prospective locations. It considered the Czech Republic, Poland and, to a lesser extent, Hungary and Austria, but finally chose the Czech Republic thanks to the favourable conditions in the Czech Republic and offered investment incentives.

In 2006 Covance Inc. (US) announced the opening of a clinical development office in Prague. This new office supports Covance's clinical trial operations in the Czech Republic and Slovakia. It would complement the network of existing clinical development offices, *inter alia*, in Warsaw and Budapest. The investment amounted to USD 21.9 million and 58 new jobs were created.

It is worth noting that many foreign multinational companies established partnerships with domestic firms or research institutes before entering the Czech economy through an acquisition or a greenfield investment. An example of a joint-venture with a domestic company leading to a greenfield investment is a pharmaceutical company Ferring. In 1993, this Swiss multinational entered in a joint-venture with Léčiva, the largest pharmaceutical company in the Czech Republic at that time. The company started greenfield construction in 1997, and in 1999 Ferring Léčiva became fully owned by Ferring.

The entry of the biopharmaceutical company Gilead Sciences in the Czech Republic is a result of partnership with a research institute. In 1991, the multinational company, headquartered in California and operating in North America, Europe and Australia, entered into license agreement with The Institute of Organic Chemistry and Biochemistry (IOCB) of the Czech Academy of Sciences. In 1992, development of small molecule antiviral therapeutics was ushered in with the licensing of nucleotide compounds discovered in

IOCB and a research institute in Belgium. In July 2006 Gilead Sciences announced a donation to IOCB in order to establish a Gilead Sciences Research Centre. Gilead pledged to provide USD 1.1 million annually to IOCB for an initial five-year period in order to fund the Centre's operations and ongoing research activities. The Centre will consist of selected research groups led by scientists from IOCB. Another agreement signed between these two parties stipulates that Gilead would provide patent services to IOCB.

These several examples of global multinational companies entering the Czech life sciences sector with different motivations and strategies provide rich food for thought. First of all, we consider establishment of a subsidiary without any R&D capacities. It would correspond to market- or efficiency-seeking FDI. A multinational company can decide to establish a manufacturing unit through a greenfield investment. This is a traditional approach under which a multinational company establishes a subsidiary producing goods and products already manufactured in the corporate network elsewhere. In the case of pharmaceuticals, the costs of setting up a new production line are higher since a company should have the necessary certification of the manufacturing processes. In case of acquisition, a multinational would buy a firm possessing manufacturing capacities and gain immediate access to the market. Both modes of entry can be beneficial for the host economy since the acquisition of existing firms integrates these manufacturing facilities into the global corporate network, and in the case of a greenfield investment the country receives capital inflows and new jobs are created.

Another case is a subsidiary combining manufacturing and R&D capacities. This type of investment may unite market-, efficiency, and/or resource-seeking FDI. In the case of a greenfield investment, it is the most desirable type of FDI for the host country since the economy benefits from capital inflows, job creation and strengthening of the knowledge base. In the case of an acquisition, a domestic firm becomes part of the global corporate network. While the production capacities are usually retained, it is questionable whether the R&D facilities will be preserved and integrated into the global network.

A somewhat less frequent case is the entry to the host economy in the form of stand-alone R&D, which results from the trend of corporate R&D internationalisation. It is typically an asset-seeking FDI. Investment promotion agencies of many countries specifically target and compete for a tiny share of the best FDI, i.e. FDI in R&D. However, attraction of R&D-related FDI is not an end in itself, integration of these subsidiaries into the host national innovation system is a key task.

A very specific case is an acquisition of stand-alone R&D facility. As it was noted, in the Czech Republic it was exemplified by acquisition of state-owned research institutes by multinational companies in the process of privatisation in the 1990s. The proponents of this

approach believed in the superiority of market forces; it was suggested that privatisation of the science and technology sector would solve the problems inherent in the socialist economy. The claim was that although the state was losing control over these R&D capabilities, they became effectively integrated into the global economy, and the issue of ownership was not relevant as long as they are physically present in the national economy. On the other hand, the opponents were concerned about the loss of national control over R&D capabilities as the biggest disadvantage of the acquisition of research institutes by multinationals. Since the control is transferred to the headquarters of a multinational company, the state remains powerless, and a multinational company can downsize or even close down these R&D labs.

4. Conclusions and Policy Implications

The biotechnology and life sciences sector emerged as a prospective area, and it can be labelled as “the 21st century gold rush”. On one hand, traditional pharmaceutical multinationals explore new opportunities in the biotechnology and seek to reinforce their positions on the market. On the other hand, governments try to jump on the bandwagon and try to develop the national life sciences industry as they are afraid to be left out of what is perceived as a source for high-end economic development.

Since the life sciences sector (and pharmaceuticals in particular) is highly globalised, targeting of FDI in the life sciences has become a natural way to develop this industry. This FDI promotion typically includes granting investment incentives such as grants, tax rebates and tax holidays.

However, unlike the gold rush in California, which was driven by resource-seeking motives, the biotech gold rush is driven by asset-seeking motives, meaning that life sciences multinationals invest in locations that offer a pool of educated workforce, unique knowledge and expertise. Several CEE countries, new EU member states, and Czech Republic in particular, emerge as such locations.

The Czech Republic offers investment incentives for FDI projects in the life sciences too, but the real motivation to enter the market is based on a different rationale, namely the access to assets. The country had a strong science foundation in pharmaceuticals and natural sciences in the past. Successful privatisation of the pharmaceuticals industry provided a boost in the development of the life sciences sector in the country. Hence, it is not surprising that acquisition of state-owned enterprises was the most common way for multinationals to enter the Czech life sciences industry. Moreover, acquisition of state-

owned research institutes is an interesting case *per se*. Presently, as the mass privatisation ended, multinational acquire private R&D companies. However, R&D activities are still limited to clinical trials and do not encompass ground-breaking research.

The developments in the Czech life sciences sector should be regarded through the country's membership in the EU, as the country belongs to the 27-member block that fosters common market and enforces harmonious regulatory environment. Some reservation about EU membership should be expressed however; this competitive advantage is being eroded as more countries join the bloc. In this way, the current study, although focusing on only one country is relevant for several other new EU member states.

Previous studies (Thomas, 1994) on the public policies to promote pharmaceutical sector show that that policy shaping the local network and stimulating demanding competitive environment is much more effective than that protecting the local market and desynchronising it from the global market. There seems to be that most CEE countries and Czech Republic in particular chose the first way. Such competitive creative environment would make domestic firms stronger, attract newcomers and will stimulate evolution of subsidiaries. In fact, FDI policy should extend from initial attraction of FDI to supporting the already existing subsidiaries to evolve towards a broader scope of activities and develop R&D capacities (Costa and Filippov, 2007). CzechInvest is set to provide "after-care" support to foreign investors.

Albeit this process is largely determined by corporate strategy on the level of headquarters, the subsidiary management can play a role, especially if it sees the opportunities on the market, not only in terms of increase of sales but also access to knowledge. As the analysis showed, sourcing of knowledge by multinational companies is taking place not only through formal acquisition of domestic firms or research institutes, but more importantly, through co-operation, partnership, strategic alliances with domestic companies. This co-operation should be further promoted for the benefits of both sides. Moreover, policies should stimulate universities and research institutes to understand market issues and engage in demand-driven research.

The present explorative study was an attempt to contribute to the scant literature on the formation of the life sciences sector in the new EU member states catching up with EU-15 (exemplified by the Czech Republic), and the role of multinationals in this process. It can be concluded that this area represent a promising research avenue and further research is needed.

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Gate2biotech: www.gate2biotech.com

OcoMonitor: www.ocomonitor.com

Note: The profiles of subsidiaries discussed in the paper are obtained from the official CzechInvest website and Gate2biotech unless otherwise is specified.

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