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The role of science parks in accelerating knowledge economy growth – contrasts between emerging and more developed economies



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Supporting Innovation and Entrepreneurship worldwide: What Science and Technology Parks can actually do

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Innovation and business country culture in relation to the development and success of STPs

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SUPPORTING INNOVATION AND ENTREPRENEURSHIP WORLDWIDE: What Science and Technology Parks can actually do

Executive Summary

Without denying the value of recommendations issued by international experts (such as the OECD) and the role of these instruments to support entrepreneurship worldwide, some challenges may be experienced by Science and Technology Parks (STPs) when trying to implement such tools at a local level. Cultural, institutional and economic barriers require a strong political consensus to be addressed and the appreciable changes expected following the adoption of new policies can typically be achieved in the mid to long run only.

Taking Luxembourg as an example, this article highlights what a STP can do at its own (micro) level in the short term to stimulate changes in the cultural and institutional (macro) environment in the longer term. Practical examples of micro tools that can be put in place by STPs are given in different topics, such as knowledge transfer, finance, entrepreneurship culture and value-added services offered to hosted companies.

Keywords: innovation policies, market-driven approach, knowledge transfer, mobility, human resources, entrepreneurship culture, access to finance, legal and administrative barriers.

Full Paper Text

I. Introduction

Luxembourg overall offers researchers and innovators favourable framework conditions owing to a central geographical position within Europe, a stable macro-economic environment, a reliable legal framework, and an experienced financial system.

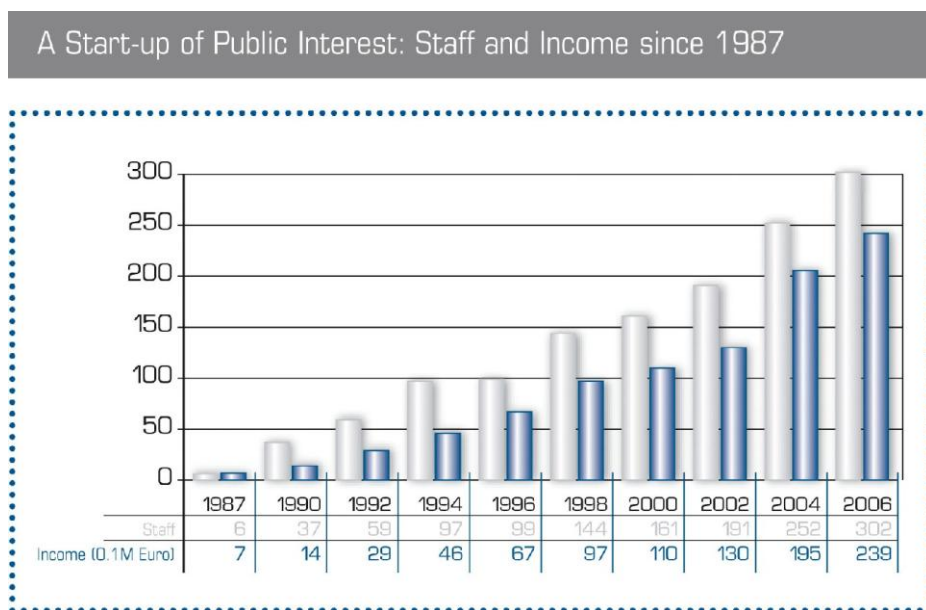
Yet, the innovation system in the country is recent and still has to be improved, as recently outlined by the OECD in its review of our national innovation policy¹. Recommendations for our country include improved interactions between knowledge providers and users, the qualitative and quantitative development of human resources, their attraction in science and technology, the broadening of private R&D through foreign investment, additional technology-based start-ups and increased and systematic spin-off activities.

Two key challenges can be identified here: one related to knowledge transfer and human potential, the other one related to entrepreneurship and business creation in the country.

¹ OECD (2007). OECD reviews of Innovation Policy: Luxembourg. Paris: OECD Publishing.

From its creation in 1987, our STP, the public research centre Henri Tudor, has been challenged to find an effective way of performing research and innovation in a very small country. We wanted to be useful in a specific user context by being opportunistic and pragmatic. In that respect, we have reached a high level of quality and maturity. CRP Henri Tudor is by far the largest public research centre in Luxembourg, not only in terms of number of employees and income (see graph 1) but also regarding the range of activities, our relationships with the outside world and international recognition.

Graph 1:



We have always considered our institution as a "start-up" of public interest, that is to say an autonomous and dynamic organisation, addressing actual and well-defined market needs with a strong unique selling proposition.

In terms of innovation, even though we try to influence changes as far as regulations, bureaucracy, incentives and support schemes are concerned, our policy is to act at the level of companies (what entrepreneurs can control) in order to better litigate the external environment (by definition beyond the control of entrepreneurs). The following sections provide examples of practical tools and methods put in place to achieve this goal.

II. Improved interaction between knowledge providers and users: market driven approach and mobility of resources

A key role for Science and Technology Parks as defined by the IASP² is the stimulation and management of "the flow of knowledge and technology amongst universities, R&D institutions, companies and markets". One key recommendation of the OECD³ from this point of view is that universities (a key element in most STPs) should act as a gateway to the private sector.

² IASP International Board (2002). SCIENCE PARK (IASP Official definition). Online. <<http://www.iasp.ws/publico/index.jsp?enl=2>>. Accessed 13 March 2008.

³ OECD (2007). Higher Education and Regions: Globally Competitive, Locally Engaged. Paris: OECD Publishing.

Luxembourg has not achieved this target as of today given the fact that research and innovation players in the country, especially the University of Luxembourg, are all relatively young organisations. The same situation occurs in other countries, either because of a lack of resources in local universities or because partnerships between public research and the private sector are built around a small number of firms and are not integrating enough SMEs.

To address gaps in knowledge transfer, "openness to business demand" and "knowledge transfer on legs" are two clues given by the experts of the OECD⁴. These strategies have both been adopted by our STP from its creation and can be implemented as well in other economic and cultural environments.

1. The market driven approach

Instead of focusing on the supply-side of knowledge transfer, countries should develop business demand for interaction. Universities should become more entrepreneurial and address the needs of a wider range of firms.

First step to achieve this is to multiply the number of research projects being done with private partners. Our STP has proactively worked in this direction. As a result, in 2006, 265 partners were contractually involved in our projects and 222 others were active participants on a non-contractual basis. 52% of our partners are private companies and/or federations.

Second step has been to secure long term collaboration with the private sector based on a cluster approach. Even though Luxembourg has been a latecomer in terms of cluster policy, our own organisation has led their development in the country with the concept of what we call "Innovation Platforms". The philosophy of these platforms is to bring together a very large range of partners. The focus is on developing multidisciplinary research and transfer activities around one specific innovation target.

Based on the "Innovation Platforms" model, our organisation has not only built the strongest links with the local market, but also heavily involved it in the definition of the STP strategy. Each innovation platform at CRP Henri Tudor has an advisory committee with representative members of ministries, administrations, public and private enterprises which helps to define and adjust the innovation activities of the STP. Each research department is moreover free to define and implement with its partners the second level management bodies and steering mechanisms that best fit the characteristics and needs of its technology field.

The result is that the focus of our research has continuously and deeply changed since the creation of the STP in a natural evolution process driven by local market needs. In ICT for instance, we have gradually evolved from applied microelectronics to strategies for ICT innovation within the financial sector. It is also based on market demand that we have strongly reinforced our presence in 2006 in services, construction, health, materials, environment and logistics.

The practical methodologies used may differ from one country to another but the global philosophy is to integrate users as much as technology in the strategy of scientific organisations. This ensures continuous adaptation of research capabilities to the changing needs of the market. It is a powerful tool to convince policy makers to provide the necessary support schemes to research and knowledge transfer, knowing that the orientations and

⁴ ibidem

activities defined together have been recognised by all players as key innovation strategic issues for the regional economy.

Another strong principle within the so-called "market driven approach" is to develop specific ways of working with SMEs in order to favour collaboration with small market players. This is a gap in most countries. In the UK for instance, the OECD⁵ indicates that only 10% of firms currently interact with universities. University-industry links tend to focus on big businesses and a few high-tech fields, often neglecting services and cultural industries which yet require innovation and can make an extensive use of disruptive technologies as more high-tech businesses do. From our own experience, financial services and the tourism industry can generate a number of opportunities for high-level research projects, especially in the field of IT security and satellite technologies.

The OECD indicates that the regional and national innovation systems can help improving public-private partnerships by giving better autonomy and incentives to institutions, including a more supportive regulatory and tax environment. A number of support schemes can be designed here, such as the use of innovation "vouchers" given to SMEs⁶. However, for encouraging governments to take such measures, STPs have to demonstrate existing and strong opportunities for innovation based on strategic projects designed for and with SME partners.

In order to achieve this, since the creation of our organisation, a basic principle has been to address innovation not only towards single companies but also and mainly towards sectors. In this context, the STP defines a technology or methodology of interest for different activities, demonstrates the application of this methodology in real cases and then transfers it to different professionals in one or several sectors.

This model has been successfully experienced in Luxembourg in the area of software selection and in the design and implementation of IT strategies for SMEs. The results are formalised methodologies with labelled providers. The impact on the global competitiveness of both end user SMEs and SME providers is clearly positive. As far as the type of funding used is concerned, the methodology design is realised by the STP researchers with national funding, whereas the demonstration of the methodology tends to be done in the framework of value-for-money contracts with interested SMEs. This of course has to be adapted to the sources for research funding available in a given country or region. In our context, the client acquires a result (and the related property rights), whereas the more fundamental results remain the STP's property and can either be used in other projects or disseminated.

This method has the advantage compared to public-funded contracts with single companies to guarantee the existence of a critical mass of different providers and users for the technology developed. It also results in a significant impact of research projects in terms of economic

⁵ ibidem

⁶ The Innovation Vouchers initiative is a scheme implemented in the Netherlands. It "aims to enable SMEs to buy knowledge from knowledge institutes (or large R&D intensive companies, also from abroad) with innovation vouchers and to stimulate interaction and exchange between the knowledge suppliers and SMEs. The measure also enhances exploitation of knowledge within the (semi-)public knowledge infrastructure. The knowledge supplier can hand the voucher to SenterNovem [an agency of the Dutch Ministry of Economic Affairs] and receive payment. The vouchers were introduced in 2004 as an experiment for new policy. An evaluation by the CPB [Netherlands Bureau for Economic Policy Analysis] indicated a positive impact on the participants and a high level of appreciation." (European Commission (2006). European Trend Chart on Innovation: the Netherlands. Online. <http://www.proinno-europe.eu/docs/reports/documents/Country_Report_Netherlands_2006.pdf>. Accessed 13 March 2008).

value creation, applied innovation and development of competences at a regional level. The close collaboration with SMEs during the demonstration phase follows a “learning-by-doing” approach, which means real transfer of knowledge rather than mere technology transfer. Such approach strongly encourages decision-makers to provide funds for research for the benefit of SMEs, knowing the impact will be on a large scale.

From our experience, deep changes in the entrepreneurial climate in a given country can be achieved when even small players play a direct and effective role in the development of knowledge and innovation. Our approach here, which has been to develop new and disruptive products and services for given market sectors in collaboration with both providers and end users, whether public or private and whether big or small, has brought very good results.

2. The power of mobility

When highlighting the importance of “knowledge transfer on legs” as one of the most effective mechanisms for knowledge transfer, OECD experts basically refer to the role of students and graduates as far as knowledge transfer is concerned. However, this kind of transfer can also be facilitated by an adequate human resources management policy in STPs.

From this point of view, the recruitment of staff in our STP is heavily based on pre-requisite competences and ability to bring added value to the regional innovation hubs in which we are involved. A PhD degree and/or academic excellence are not considered sufficient in themselves to characterise our key staff, a pool of resources with an adequate balance between technological knowledge and management capacity being the standard in terms of human resources.

As a result, experience gained in the STP is highly valued in the private sector thanks to the reputation of the STP in terms of research skills but also project management skills and ability to actually implement and adapt innovative processes in a number of economic sectors. As a complement to the traditional concept of mobility in research, i.e. exchanges of researchers between academic institutions at an international level, our STP also encourages mobility as a long-term/permanent move from our research centre to other local non-research institutions. This is done by putting resources at the disposal of the private sector through the Innovation Platforms (which create links between people), strong collaborative projects, and last but not least, a valorisation process traditionally oriented towards the bundled transfer of both technology and staff.

In 2006, 30 employees (on a total of 302) left our STP to join other institutions from the private and public sector. The total number since the STP’s creation has been 339. Such people have contributed in a significant way to the transfer of competences and the spirit of innovation in the private sector.

CRP Henri Tudor is thus acting as an open organisation in terms of resources, ensuring the diffusion of the tacit, complex and specific knowledge embodied in its scientists, researchers and engineers through the mobility of these resources. As long as it remains under control and balanced in order to avoid a too important loss of expertise in the STP at a given moment, this human resources policy provides very good results in terms of knowledge transfer. It also opens the door to the regular introduction of newcomers in our organisation, which ensures inspiration for our strategy and the active exchange of new ideas.

We are very well aware that the flexibility of our human resources policy is highly related to the fact that we are not a university-based research institution and that all our employees

except three are hired under private contracts. The model might be more difficult to exploit in organisations where research is strongly linked to academic institutions with an established and formal public career path. Our experience doesn't have to be reproduced as such in other countries but can be adapted by STPs. The idea is to favour staff exchanges with the private sector as far as possible, starting with co-education inside the STP. This means hiring people with mixed profiles for non-academic related tasks (especially for people who play the role of interfaces between researchers and private partners) and favour mixed teams in the organisation, ensuring that researchers and business employees have continuous contacts and exchanges all along the life of a research project (valorisation especially should be considered from the beginning of each project and discussed all along the project life cycle).

The impact of any kind of knowledge on legs process on the general innovation climate in a country is significant in that staff mobility enables public actors to better understand the needs and constraints of private market players, while private market players have a fairly good knowledge of procedures and interests from the point of view of researchers. People with expertise from both the public and private sector also are in a very good position to define the key instruments needed to facilitate technology transfer and influence policy makers, therefore contributing in a significant way to the evolution of the macro-environment external to the STP. Mobility also allows people to acquire the ideal profile for being a successful entrepreneur (i.e. technical knowledge but also business experience). It encourages company creation and spin-off activities since the cultural gap that so often separates university research from business needs is being somehow filled.

III. The STP and the growth of innovation-based companies: turning challenges into opportunities

The second mission of STPs as described by the IASP⁷ is to facilitate "the creation and growth of innovation-based companies through incubation and spin-off processes", and the provision of "other value-added services together with high quality space and facilities". Each STP thus has to develop a wide range of original and high-level services, carefully designed to have a strong positive impact on the entrepreneurial climate in the region. Crucial areas for all STPs from this point of view are legal and administrative services, access to finance, support to hosted companies in order to attract qualified resources and the dissemination of a positive vision of entrepreneurship from a general point of view.

1. The services of the STP as a way to reinforce human potential for innovation

1.1 Access to highly-skilled resources

Small businesses need highly-skilled employees with experience that is immediately relevant to the positions they seek to fill. However, in a context of skills shortage, recruitment is a particular problem for small businesses, which may not be able to compete with larger businesses in terms of salaries and other benefits. The cost of an unsuccessful hire also impacts small businesses more because they have less margin for error—they may not have duplication in a position that allows work to continue while a new hire is being sought and trained, and the people who are functioning as hiring managers are also key employees in the business and cannot afford to spend much time in the hiring and training process.

⁷ IASP International Board (2002). SCIENCE PARK (IASP Official definition). Online. <http://www.iasp.ws/publico/index.jsp?enl=2>. Accessed 13 March 2008.

Taking into consideration the competition for skilled workforce and the difficulty for small innovative businesses to train young employees with good qualifications but little work experience, a key challenge for support organisations, including STPs, is to provide for and help to develop the talent pool needed. In this context, our STP has developed a programme aimed at providing interns to hosted companies based on the following principles:

- The interns are recruited, managed and paid by the STP, minimising the paper work and coaching to be done by hosted companies and providing access to resources for free.
- The interns are put at the disposal of the companies but preferably within the framework of a joint research project or a pooled service managed by the STP (for instance, the Sales and Marketing Support programme we offer to our hosted companies). This means that interns are actually working for and have a strong link with one or two specific hosted companies, but are also being mentored by a key STP staff member. These different resources work together in the same direction on a well defined project for the benefit of the company.

This system allows us to offer interns interesting and challenging positions with a good mix between work in a well-established high-tech institution (the STP) and missions for fast-growing small businesses (hosted companies). As a result, some high-profile students can be attracted. These students are usually flexible and able to adapt to the culture and specific constraints of small businesses. They provide fresh ideas and enthusiasm on strategic projects but under supervision of experienced STP coaches able to guide them if necessary.

Depending on the environment of the STP, the internship scheme can be organised at a regional, national or international level. In our case, Luxembourg being a small but multicultural country, the strategy has been to create partnerships with leading-edge universities, technical and business high schools abroad. Our STP thus has partnerships with a number of institutions in neighbouring countries but also more distant locations, such as the ESADE business school in Barcelona, Spain.

The OECD indicates that in both advanced economies and developing countries, student international mobility "remains relatively small but has grown at an unprecedented pace in the past decade. The provision of tertiary education abroad through academic partnership, franchising, the opening of a branch campus or other arrangements, has also grown significantly". "Cross-border education can typically help to expand quickly a tertiary education system and to increase the country's stock of highly skilled human capital"⁸.

In our experience, the added-value of foreign students is that in addition to technical skills, they provide an insight on new marketplaces and some linguistic and cultural background highly beneficial to hosted companies seeking international expansion. Our most recent experience, for instance, was with a Mexican student who assisted one hosted company in expanding in Latin-American countries. The focus of hosted companies on internationalisation is very important in Luxembourg and deserves to be supported in all countries. As highlighted by the Athens action plan for removing barriers to SME access to international market⁹, "the opportunities for international business dealings have grown dramatically as the traditional barriers associated with distance and cross-border transactions have been reduced through

⁸ OECD and World Bank (2007). Cross-border Tertiary Education: A Way towards Capacity Development. Paris, OECD Publishing.

⁹ OECD and Asia Pacific Economic Cooperation (APEC) (2006), "The Athens action plan for removing barriers to SME access to international market". Adopted at The OECD-APEC Global Conference in Athens (Athens, 8 November 2006). Online. <<http://www.oecd.org/dataoecd/4/17/37818332.pdf>>. Accessed 12 March 2008.

new technology and trade negotiations. But the development of a fast-changing and increasingly complex global marketplace has also placed considerable pressures on firms, particularly SMEs”.

When implemented at a local level, an internship scheme provides different but equally strong added-value to the services of the STP. It is a good opportunity for companies to test future job candidates and thus make good recruitments. Most interns, especially MBA students, already have good work experience which they are seeking to complement with an additional diploma. These are highly skilled potential employees for small businesses and of course potential future entrepreneurs also. If not experienced enough, the fact that they are working in close relationship with a scientist or a manager of the STP ensures adequate guidance and support to the students, which are trained as needed.

We consider interns as a good way to influence the local environment in the long run. Some of them will choose to stay in a start-up for a long-term position after their internship, having appreciated the work environment. Others will promote start-ups and STPs as a great place to work in, encouraging other people to apply for open positions. Former interns are very good advocates of our model and environment and more powerful opinion leaders among youth than senior consultants, the alternative usually being used to counter shortages of skilled workforce in small businesses.

Interns are of course also very good advocates of the interest of and rewards in being an entrepreneur, and disseminate a positive vision of entrepreneurship in the region. The mechanism we are using here is changing failure perception and addressing risk aversion in the local society.

1.2. Failure perception

Talent and creativity can be promoted by education but this pre-requisite can produce results in an entrepreneurship friendly society only. There are many forms for innovation and people may still choose to have a different status than entrepreneur if given other opportunities in the local context. Moreover, self-employed people may tend to focus on businesses offering traditional products and services rather than disruptive ones which are more complex and risky to develop and sell.

Risk of failure and its perception plays a key role in the decision to become an innovative entrepreneur. Two factors have to be taken into consideration: the effective situation in the country on the one hand and the cultural perception of failure on the other hand. Are the consequences of closing a business actually negative for individuals (low recovery rate of investment done, loss of personal financial resources in the process...)? Is failure stigmatised in the local society, and as such considered a highly negative personal experience by individuals?

If the answer to one or both questions is no, you are one of the lucky STPs which are operating in a globally favourable context. If the answer to one question or both questions is yes, then, is there anything the STP can do about it? The actual consequences of closing a business depend on the national regulations. The STPs can push for changes and encourage reforms but are not able to change many things by themselves in the legal and fiscal environment. What a STP can do is to try to smoothen as much as possible the process of business closure by offering alternatives to hosted entrepreneurs.

We have highlighted in the first section the importance of encouraging the mobility of researchers from the public to the private sector. The other way round, we try to open doors for entrepreneurs who would like to quit their business (whether successful or not) and do something different for a more or less long period of their life. The policy of our STP has always been to be a strong player in a strong ecosystem. We fully subscribe to the idea that entrepreneurship is not a person but a process and has to be considered a team sport¹⁰. The deep involvement of hosted entrepreneurs in the research projects and other activities of our STP puts them in a very good position to apply for open positions in our institution. A former manager of a start-up thus recently joined the ICT technology transfer team in our STP. Entrepreneurs who stay independent but change their business focus are offered if interested to keep strong links with our institution. If service-oriented, businesses cannot be hosted anymore in the high-tech incubator of the STP, but any useful collaboration which can be maintained between the business team and the remaining hosted companies is encouraged and financed by the STP.

The ex-entrepreneurs can keep on playing a key role in the entrepreneurial climate of the country by being mobilised as external coaches or speakers at the STP events and workshops. From our experience, testimonies of people who didn't succeed with a business venture but have been able to find other ways of living and remain positive about their entrepreneurial experience represent as interesting models as the ones who succeeded. It indicates that rather than being a social status gained by the ones who are successful and the ones who are successful only, entrepreneurship is a learning process which can bring positive results in terms of skills and experience, whatever the outcome of the venture is. What is important here is to open doors for individuals through participation to research projects and other activities of the STP. The institution plays its role when it provides people with outstanding references, primarily for the benefit of their present business, but also as a personal opportunity to try something different in the future.

In order to influence the local and rather risk-averse culture in Luxembourg, a second policy implemented by our STP has been to widen as far as possible the cultural references offered to entrepreneurs by building a very strong international ecosystem inside our organisation. Our entrepreneurs are coming from different countries¹¹, which creates strong opportunities to share different views, values, experiences and visions. The same applies to the STP itself, since as already mentioned, most interns are foreigners and this is true as well for our employees¹². From this point of view, it's interesting to note that English is not an official language in Luxembourg but is however extensively used as a working language in the STP.

The channels used to actively pursue opportunities to welcome foreign entrepreneurs and researchers in Luxembourg have been to build partnerships with official structures abroad and perform exchanges with other STPs. Nationals working abroad are being used as gateways to establish links with foreign entrepreneurs and institutions. Our STP has signed a number of

¹⁰ This theory was presented by Jerome S. Engel, Founder and Executive Director of the Lester Center for Entrepreneurship and Innovation, California, at a recent IASP seminar (Jerome S. Engel and David Charron. (2007) "Technology Entrepreneurship Education: Theory to Practice". In IASP Pre-Conference Entrepreneurship seminar (Barcelona, 1st July 2007)).

¹¹ The founders of the companies currently hosted in the STP are coming from the following countries: France (34%), Germany (14%), Luxembourg (9%), Belgium (9%), Italy (9%), Greece (5%), Russia (5%), India (5%), Argentina (5%) and Ireland (5%).

¹² The nationalities of employees in the STP were as follows at the beginning of 2007: French (50%), Belgian (17%), nationals (16%), German (11%), Italian (2%), Portuguese (1%), Algerian (1%), Danish (0,3%), Finnish (0,3%), Bulgarian (0,3%), Polish (0,3%), Chinese (0,3%), Tunisian (0,3%), Pakistanis (0,2%).

cooperation agreements and memorandums of understanding with foreign institutions. Hosted companies are as far as possible included in these collaborative international schemes.

Opportunities to create strong links with other countries are more or less available depending on regional and national cultural environments. Luxembourg is a favourable ground from this point of view as it has traditionally established very strong links with its neighbouring countries. Still, the internationalisation exercise can be done by most STPs which can try to benefit from existing opportunities in their local context. In some countries, expatriates coming back to homeland can play a very important role in bringing a multicultural dimension to the entrepreneurial landscape.

Whatever the scheme being used, a mixture of cultural backgrounds is a very strong and positive step towards the implementation of international best practices at a local level. Direct and live exchanges between people who confront their views mean that different business management models are being tried in the country and can be compared for the most effective and innovative practices to be promoted. The experience of the people coming from the most dynamic and fast-changing countries ideally complements the strong traditional and proven methods of doing business used by others based on their own and different personal and cultural background.

2. The STP as a gateway to success: how to leverage external barriers

2.1. Access to finance

In the previous section, we have highlighted some ways to address failure perception in a risk-averse environment. Still, the main scope of a STP is to help hosted companies achieving success. From this point of view, access to finance is one of the most determinant factors.

"Most OECD countries perceive that a lack of appropriate financing has been a hindrance to the expansion of innovative SMEs (ISMEs)". In a small number of countries only, the ISME sector has expanded significantly, with positive implications for employment and technological competitiveness. Most countries have partial gaps, severe especially in early-stage and highly innovative firms, while in emerging, transition and developing economies, financial gaps tend to be more pervasive¹³.

In Luxembourg, even though the country is a leading financial place at an international level, access to seed finance is definitely a challenge. The Luxembourg Business Angel Network (LBAN) for instance is a very recent institution which is struggling to expand the number of active business angels in the country. For loans, collaterals or personal, solidary and indivisible declarations of surety are typically required.

Recommendations of the OECD¹⁴ (as given to Eastern-Germany but the guidance is to be considered relevant to most countries) are to push for the following changes as far as business funding is concerned:

- accelerate decision making with respect to enterprise access to funding,

¹³ OECD (2006). SME financing gap: theory and evidence. Vol. 1. Paris: OECD Publishing.

¹⁴ . OECD Economic and Employment Development Programme and German Federal Ministry of Transport, Building and Urban Affairs (BMVBS) (2008). Compendium of policy recommendations, international learning models and good practice in East Germany. Online. <http://www.oecd.org/document/5/0,3343,en_2649_34417_37963013_1_1_1_1,00.html>. Accessed 12 March 2008.

- encourage banks and financial institutions to play a stronger role
- study how to introduce more venture capital
- extend micro-lending
- develop programmes to boost the number of business angels.

It is obvious that such initiatives have to be undertaken and encouraged but it is clear as well that they are more or less far beyond the control of regional STPs. What is clearly in contrast the responsibility of any STP towards hosted companies are the following additional OECD recommendations¹⁵:

- address weaknesses in business plan preparation and business development,
- help firms assess their own investment readiness,
- increase investment readiness of hosted companies.

Our STP is actively pursuing funding opportunities for hosted companies through direct contacts with investors and participation to investment forums at a regional and international level, but the emphasis is clearly put on the investment readiness side of the game.

Although the practical modalities are different, the philosophy of our services can here be compared to the business linkage initiatives in emerging economies¹⁶, through which large companies are encouraged to use local SMEs as suppliers. Our STP is using the strong links it has with large or medium-sized companies located locally or elsewhere to accelerate and scale-up commercialisation processes for hosted companies. The entrepreneur is confronted in market-like conditions as soon as possible and a strong emphasis is put on positively influencing adoption of the products and services by future clients. We assist our companies in finding industrial partners able to play the role of references for companies at the earliest steps of the commercialisation process.

Connections of the STP with large companies can be leveraged here but peer networking can also be extensively used. Our STP has always considered synergies and collaborations between hosted companies as a key performance indicator. 2006 saw 19 collaborations between hosted companies, which for most included commercialisation-related purposes.

In practice, the goal pursued by our STP is to introduce some specific pre-financing steps in the early development process of our technology-based companies as compared with reference models (see figure 1).

¹⁵ *ibidem*

¹⁶ For further information on business linkage schemes, see: Jenkins, Beth, Anna Akhalkatsi, Brad Roberts, and Amanda Gardiner (2007). *Business Linkages: Lessons Opportunities and Challenges*.

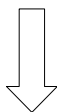
Figure 1:

Product strategy as described by J.S. Engel¹⁷:

"If you...

- *identify a NEED*
- *conceptualize a SOLUTION*
- *demonstrate a PROTOTYPE*
- *develop a roll-out PLAN and get FUNDING*
- *MARKET the product using the correct channels and packaging*
- *UNDERSTAND the changing climate and adjust for it, and*
- *develop a strong relationship with CUSTOMERS*

... Then you have beaten a path to your CUSTOMER'S door with a solution that solves a real problem."



Fund raising strategy as applied on the basis of the here above model:

- *identify a need*
- *conceptualise a solution*
- *demonstrate a prototype*
- *TEST IT WITH A WELL-ESTABLISHED MARKET PLAYER*
- *develop a roll-out plan*
- *ATTRACT SOME PILOT CUSTOMERS*
- *get funding*

2.2. Administrative and legal constraints

In its Bologna Charter on SME Policies¹⁸, the OECD highlights that SME competitiveness would benefit from a regulatory environment which does not impose undue burdens on SMEs. Recent discussions led by UNECE¹⁹ confirm that in both developed markets and catching-up economies, a major precondition for unhampered enterprise development are favourable regulatory and institutional conditions. This means that the global administrative environment has to be protective but flexible enough to guarantee ease of doing business for national companies.

From this point of view, Luxembourg is globally ranked 42 out of 178 economies by the World Bank²⁰. This is a good rank but which is mainly due to the good tax environment and the high

¹⁷ Jerome S. Engel and David Charron. (2007) "Technology Entrepreneurship Education: Theory to Practice". In IASP Pre-Conference Entrepreneurship seminar (Barcelona, 1st July 2007).

¹⁸ Ministers and Representatives of governments of Algeria, Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, ... (2000). The Bologna Charter on SME Policies. Paris: OECD Legal Instruments and Related Documents.

¹⁹ UNECE (2007). "Conclusions and Recommendations." In UNECE International Conference on Reducing Barriers to Entrepreneurship and Encouraging Enterprise Development: Policy Options (Geneva, 18–19 June 2007). Online. <<http://www.unece.org/ceci/documents/2007/eed/rec.pdf>>. Accessed 12 March 2008.

²⁰ The World Bank Group (2008). "Doing Business 2008: Explore Economies: Luxembourg". In Doing Business. Online. <<http://www.doingbusiness.org/ExploreEconomies/?economyid=115>>. Accessed 12 March 2008.

efficiency of contract enforcement in the country. As illustrated in tables 1 and 2, there are also areas for improvement, the main one being a high rigidity of employment laws.

Table 1: Luxembourg

Doing Business 2008	Rank
Ease of Doing Business	42
Starting a Business	41
Dealing with Licenses	36
Employing Workers	164
Registering Property	116
Getting Credit	97
Protecting Investors	107
Paying Taxes	17
Trading Across Borders	32
Enforcing Contracts	2
Closing a Business	46

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“Employing workers” in table 1 refers to the difficulties that employers face in hiring and firing workers. Further details on the situation in Luxembourg compared to the OECD average are given in table 2. Each index assigns values between 0 and 100, with higher values representing more rigid regulations.

Table 2:

	Luxembourg	OECD
Difficulty of hiring	67	25.2
Rigidity of hours	80	39.2
Difficulty of firing	40	27.9
Global rigidity of employment	62	30.8

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From a general point of view, legal and administrative barriers are difficult ones to leverage, since they typically have a good reason why rooted in the national historic, economic and social environment and by definition are far beyond the power of STPs. So, what can be done here to assist hosted companies and make things evolve?

To assist companies, an obvious role which has to be played by the STP is to inform and train entrepreneurs. In-house services have to be developed, which facilitate paperwork and compliance of hosted companies. Such services are especially important in economies in transition, with frequent changes in commercial laws, tax regulations, etc... They are common in science parks but, from our point of view, have to play heavily the network card to be really efficient.

The role of the professionals of the STP goes far beyond hands-on expertise available to companies. The structure here has to act as real facilitator in discussions, ensuring that solutions to the problems can be found in collaboration with all parties involved. In order to be in a good situation to make things evolve, the approach of our STP has been to create strong links with administrations and establish relationships based on mutual trust. In addition to research, commercial and financial partners for our hosted companies, our STP actively seeks and maintains cooperation with regional institutions through sponsorships (municipality), workshops (we have for instance recently had a session related to training regulations with the public institute in charge of professional training dossiers in Luxembourg), but also through bilateral discussions and exchanges.

We also maintain close follow-up of hosted companies, a demanding selection process and high quality standards, which means that being hosted in the STP is a strong reference for a company at a local level, giving trust and credibility towards public institutions.

As a result, we have been able to assist our companies through a number of demanding processes, such as the one required to hire foreign employees in Luxembourg, as illustrated by the following statement from one of our hosted companies (now successfully exited).

"I could focus on achieving my objectives within an ideal & professional work environment for a technology-based company. Being hosted within the incubator was also a crucial benefit for us for solving some administrative burdens we experienced in employing non-European highly-qualified software developers, without whom the company probably wouldn't have known such a growth and success."

Marco Peretti, SecureWave, www.securewave.com.

We believe that this collaborative approach with public institutions should be applied by STPs as needed to facilitate procedures at their local level as far as customs, building permits, and other potentially heavy procedures are concerned. By playing this role, STPs definitely act as unique support organisations in their region, "fostering the founding, growth and international expansion of innovative hi-tech companies and acting as mediator organisations in collaboration with universities, companies and local authorities"²¹.

²¹ Quotation from the Finnish Science Park Association TEKEL. Homes for innovation. Online. <http://www.tekel.fi/mp/db/file_library/x/IMG/11281/file/TEKELsiteENG.pdf>. Accessed 12 March 2008.