ESPON 2013 Programme

Walferdange, 12th November 2013

Research & Innovation: Which priorities for structural funds in Luxembourg?

It is a key aim of the EU2020 strategy and of the Luxembourg government to promote research and innovation ("smart growth"). The 2014-2020 programming period of the Structural Funds offers an opportunity to support projects in this field at national, cross-border and transnational levels.

This leaflet synthesises the results of a consultation process organised by the ESPON Contact Point of Luxembourg in summer and autumn 2013 in the framework of the USESPON project. First, it aimed at analysing the relevance of ESPON results in the field of research, development and innovation (RDI) in Luxembourg. Second, this process reflected on possible priorities for the future operational programmes of the structural funds.

This process involved either experts in the field of RDI or those responsible for drafting operational programmes. The consultation process has been framed by a Delphi technique. First, participants received "support material" presenting the situation of Luxembourg according to the ESPON results. Second, they participated in a workshop on 11th July 2013 and provided numerous inputs. Third, a synthesis based on the results of the workshop was provided together with a questionnaire giving the experts the opportunity to deepen and concretise their contribution.

By summarising this consultation process, this leaflet aims at 1) working out a profile of Luxembourg on the basis of ESPON results in the field of RDI and 2) developing recommendations of how future-oriented innovation strategies can be implemented in the context of European Territorial Cooperation. The final version of this document was published on the ECP website in autumn 2013.

1. The profile of Luxembourg in the field of research and innovation (based on ESPON results)

The relevance of research and technology in Luxembourg

R&D spending and human capital relevant for innovation

The map on the next page shows that only a few regions will be able to reach the objective of the EU2020 strategy of achieving a 3% share of the GDP expenditure on R&D. At the same time, private sector investment is considered central to enhancing economic productivity and growth (2% objective in the EU2020 strategy).

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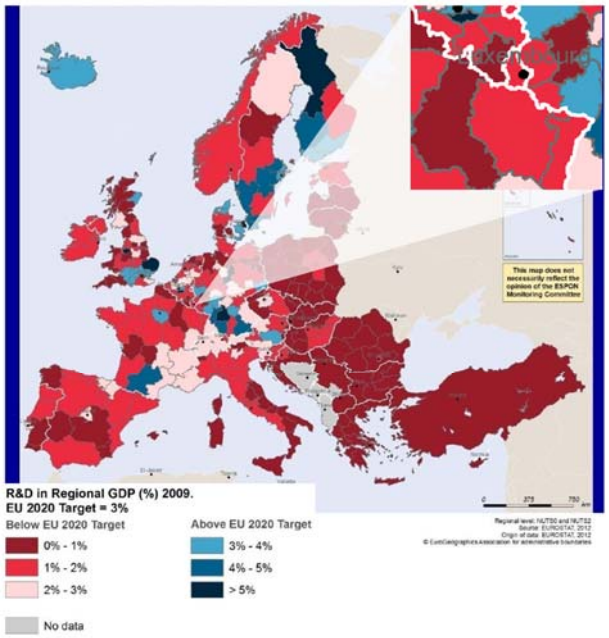


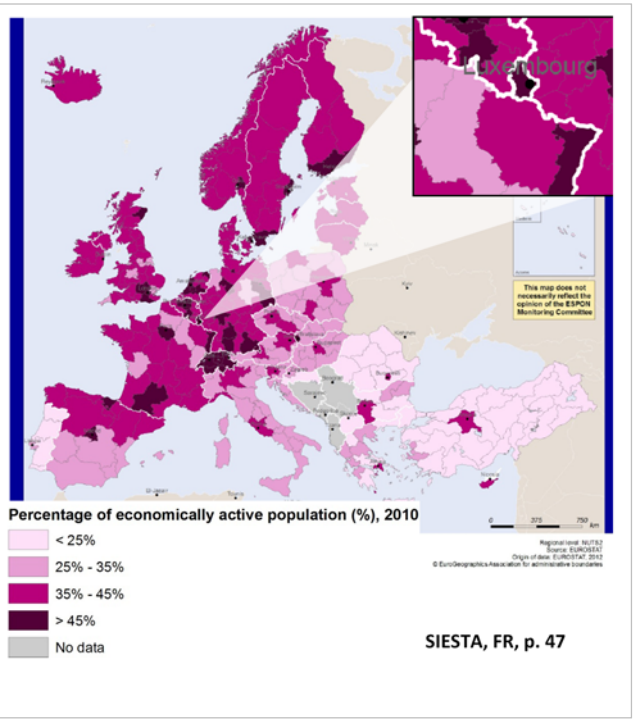
Map 1: General expenditure in R&D as percentage of regional GDP, 2009

Source : SIESTA, FR, p.44

Human resources in science and technology are concentrated in the urban areas in North-West Europe. However, some regions show a mismatch between human resources and R&D spending, for example regions with high human resources in science and technology (Luxembourg, Province Namur), but comparatively low R&D spending.

Situation in Luxembourg and the Greater Region

The two regions of Walloon Brabant (7.63% of the GDP for R&D) and Rheinehessen-Palatinate (3.3%) show a good spending level. Luxembourg invested only 1.66% of its GDP in R&D in 2009, while the national objective is 2%. A small increase can be observed in the Greater Region, with the larger increases on the German side. In the Greater Region, the private sector does not play an important role (with the exception of Rheinehessen-Palatinate), despite the situation being slightly better in Luxembourg and Wallonia (between 1 and 1.5% R&D expenditure from the private sector, ESPON/SIESTA project, annex C, p.44). In Luxembourg, the private R&D expenditures rely upon a small number of companies.

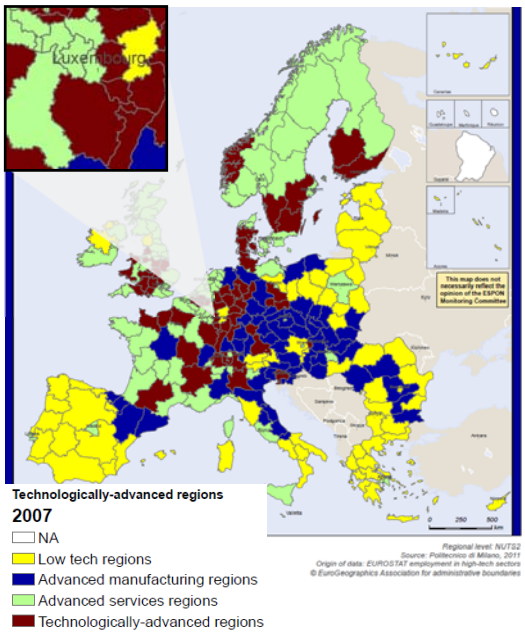


SIESTA, FR, p. 47

« Brain power » is fundamental for innovation in Europe. The map illustrates the distribution of the total workforce aged between 15 and 74, working in science and technology. There is a concentration of scientists and technologists in North-West Europe, Scandinavian countries and urban areas (e.g. London, Copenhagen, Zurich and Utrecht).

In the Greater Region the situation is heterogeneous: Luxembourg (54.3% in 2010, an increase from 36.2% in 2000), Walloon Brabant (61.0%) and Namur province rank particularly high (>45%). In Luxembourg, this situation is due to the importance of the financial sector which is responsible for a substantial share of employees in this category.

Spatial Patterns of technology



Map 2: Technologically-advanced regions in Europe

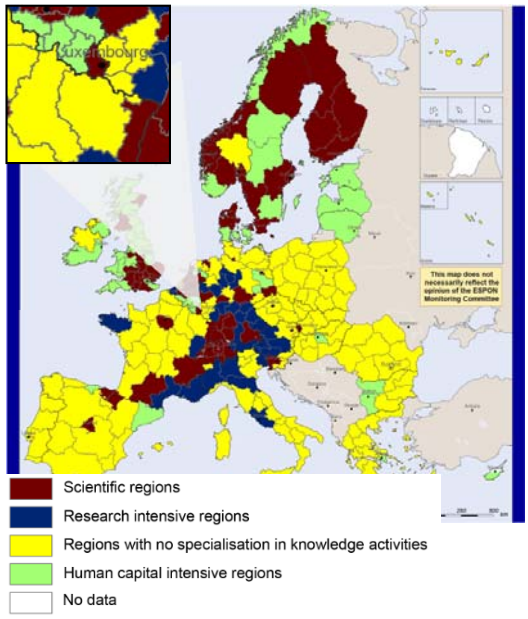
Source : KIT, FR, p.4

There is a remarkable concentration of the advanced manufacturing or services activities in the core of Europe (most of the low-tech regions are in the periphery). It is also striking how few European regions can be counted as «technologically-advanced», i.e. those regions with a high level of industries in medium/high tech manufacturing and knowledge-intense services. With the previous map in mind, it can be concluded that not all high-tech regions attract equivalent R&D spending.

Situation in Luxembourg and the Greater Region

Luxembourg, together with most of Wallonia, is classified as an «advanced services region», an important part of the knowledge-intense industry (55% of all employed), with little-developed medium- and high-tech industry. Due to this situation, these regions face the challenge of transferring research knowledge into innovation. Lorraine, Saarland and most parts of Rhineland-Palatinate, on the other hand, represent «technologically-advanced regions». These regions depend mainly on external knowledge when attempting to produce knowledge-intensive innovation. At the same time, these regions display a stronger level of entrepreneurship and creativity in using external knowledge and turning it into innovation.

Spatial Patterns Knowledge Economy



Map 3: Scientific regions in Europe

Source : KIT, FR, p,4

Similarly, the knowledge economy is still in its infancy throughout large parts of Europe (regions in yellow on the map). There is a remarkable concentration of highly-qualified human capital and research-intensive regions in the core of Europe (incl. Scandinavian countries). A 'knowledge economy' is one that is able to produce new knowledge from technologically advanced sectors and/or functions present in the area and/or where knowledge obtained is from other research networks. 'Scientific regions' are those with high research activity and higher than average high-quality human capital. With these maps in mind, the EU2020's objective of 3% R&D spending for all regions can be questioned both in terms of feasibility and its potential effect on growth and employment.

Situation in Luxembourg and the Greater Region

While Luxembourg and Walloon Brabant have a clear specialisation in knowledge (both research and human capital intense regions). Lorraine, Saarland and Rhineland-Palatinate have a specialisation in technology, Regierungsbezirk Rheinehessen-Palatinate being research intensive (see previous map). The rest of Wallonia is rather weak both in terms of knowledge and technology, but still human capital intense.

Luxembourg as a 'science region' faces a triple challenge:

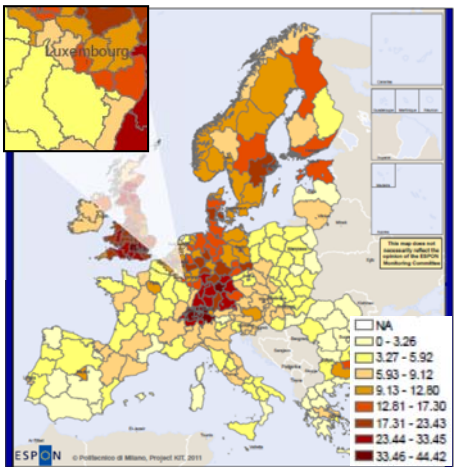
1) to remain attractive for highly qualified human resources (attract and keep human capital),

2) to ensure that research results are transferred into innovation (currently, the Ministry of Economy is working on a stronger coherence between research and innovation strategies),

3) to increase creativity to identify potential applications for research knowledge.

Innovation Structures in Luxembourg and the Greater Region

Types of innovation and regional innovation patterns



Map 4 : Share of firms introducing product innovation

Source: KIT, FR, p. 12

This map shows the activity of enterprises in product innovation, with data based on the Community Innovation Survey. The analysis shows that while product innovation leads to new jobs, process innovation can lead to job losses in less research-intense regions due to low elasticity between job creation and process innovation.

Situation in Luxembourg and the Greater Region

The map shows that neither Luxembourg nor the Greater Region as a whole is particularly active when it comes to product innovation. This picture looks similar for process innovation, but much better for more incremental marketing and organisational innovation. In Lorraine and Wallonia, process innovation may lead to job losses due to the average negative effect of process innovation on employment in this regional type (see next map). Luxembourg also performs quite well when it comes to environmental innovation[1].

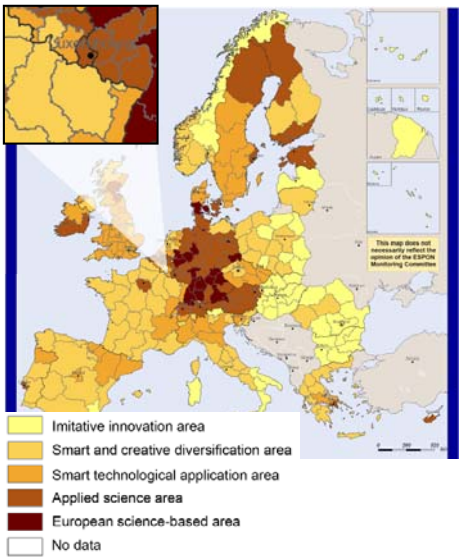
Regional innovation patterns

The KIT project developed 5 empirically based regional innovation patterns. These represent different combinations of innovation process phases. The typology is based on an extensive range of indicators including R&D spending, share of inventors and entrepreneurship. These pathways to innovation are regionally diverse and of different efficiencies. R&D requires a critical mass to be efficiently used. These different patterns question «one-size-fits-all» innovation policies and the strong R&D focus of the EU2020 strategy.

[1] measured on the basis of the number of green patents (technology fields including water and air pollution control, solid waste management and renewable energy, ESPON KIT, DFR: 22).

Situation in Luxembourg and the Greater Region

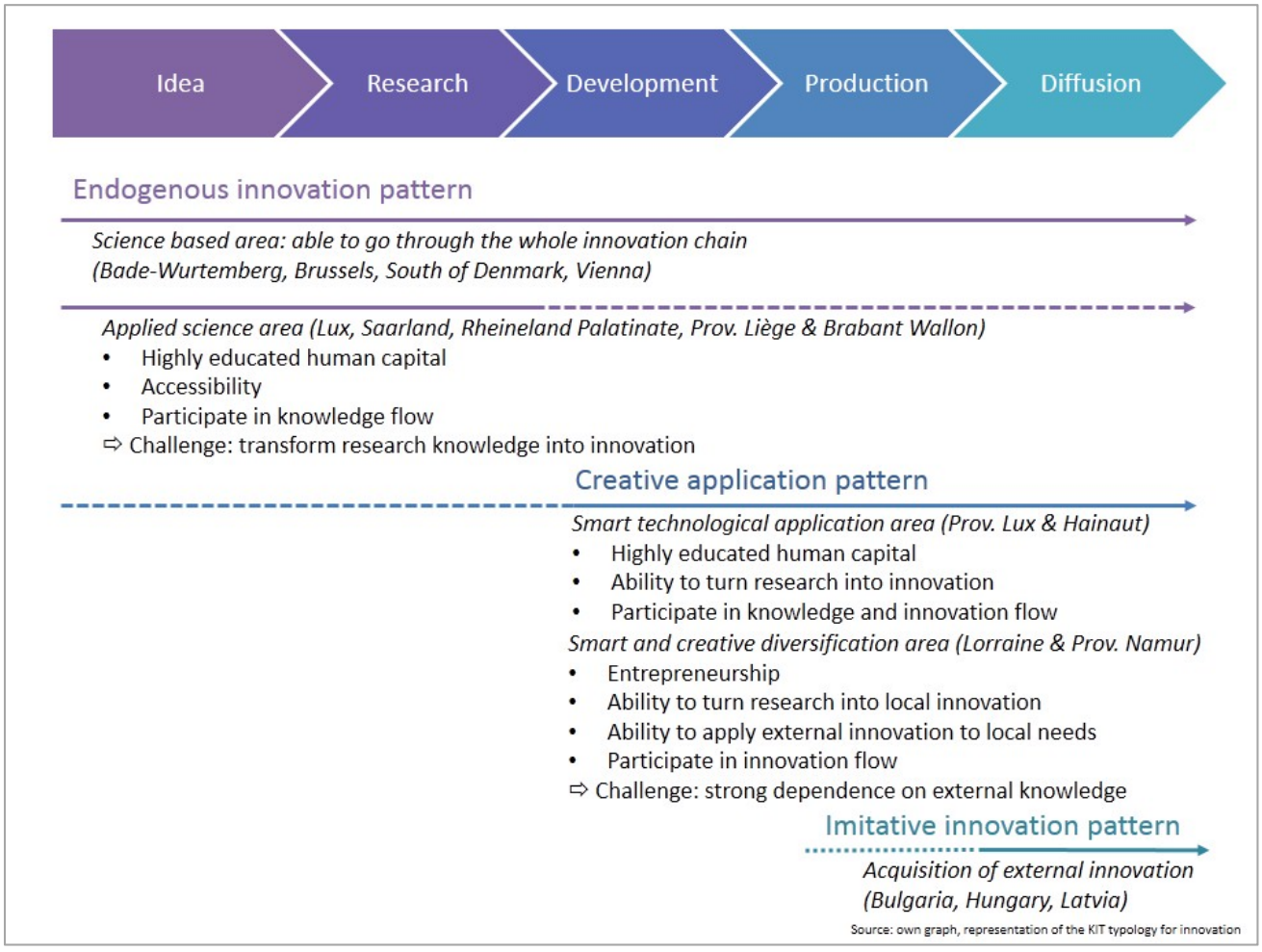
The situation of Luxembourg and the Greater Region is depicted in the following diagram. Schematically, there are two clusters of regions:



Map 5: Territorial patterns of innovation in Europe

Source : KIT, DFR, p.15

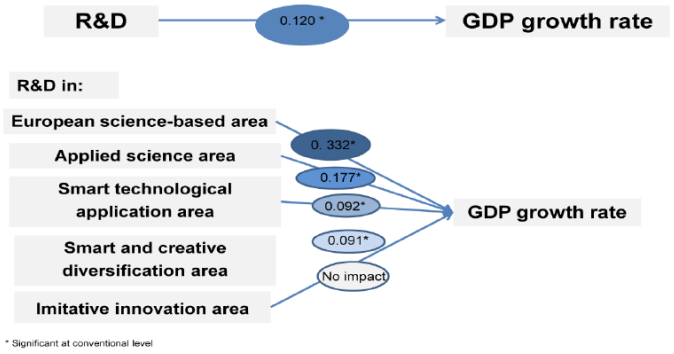
- "Endogenous innovation pattern": all steps required for knowledge creation in the innovation chain can be performed in that region (e.g. knowledge creation and diffusion, participation in research networks, Research and Development and transformation into innovation). This category comprises Luxembourg, Saarland, Rhineland-Palatinate, Province de Liège and Walloon Brabant.
- "Creative application pattern": regions having the ability to transform the knowledge into innovation adapted to their local needs. Knowledge is imported and converted into local applications (e.g. human capital having the ability to access knowledge and to turn it into local applications, participation in innovation flows, entrepreneurship and has an industrial basis - "tissu industriel"). This category comprises Province du Luxembourg, Hainaut, Namur and Lorraine.



R&D as a regional growth factor?

The graph depicts the elasticity of GDP growth to R&D differentiated according to the five regional innovation patterns. Values are highest where the research landscape is strongest and endogenous potentials high. The link between R&D, innovation and growth is thus not as direct as often assumed and therefore the focus on R&D and technology as innovation strategies is not generally sufficient. Innovation, on the other hand, has a stronger effect on GDP than R&D alone as it is also based on sources other than formal knowledge.

Situation in Luxembourg and the Greater Region



Graph 1: Elasticity of GDP growth rate to R&D by patterns of innovation

Source: KIT, FR, p. 41

According to this analysis, investing in Luxembourg, Saarland, Rhineland-Palatinate, Walloon Brabant and Liège region would have considerably higher impact than elsewhere in the Greater Region (lower impact in Provinces of Luxembourg and Hainaut). The investment would have a rather weak impact in the Namur province and Lorraine.

Summing-up: Profile of Luxembourg and the Greater Region in the field of RDI

	Economic orientation	R&D	Innovation
Challenges	• High-tech sector not yet that well developed in Luxembourg and Wallonia.	• No specialisation in knowledge activities in Lorraine, Saarland and most of RP • Luxembourg and Walloon Brabant are identified as « science regions » and are characterized by attractive research infrastructures. • However, in Luxembourg, the research infrastructure is relatively new (no path dependency) and many networks, collaborations and specialisations still need to be created. • As R&D spending is highly concentrated among a few companies, involving more firms in R&D activities does not necessarily lead to a substantial increase of the total private R&D expenditure.	• 'Applied science areas' such as Luxembourg, RP, Saarland and parts of Wallonia may not be particularly strong in transferring research knowledge into innovation. • Lorraine and south Wallonia depend on external knowledge when attempting to produce knowledge-intense innovation • Strong orientation towards marketing innovation in most of the parts of the Greater Region, but some product and process innovation also takes place.
Opportunities	• Foster Medium/high tech in Lorraine, Saarland and RP • Service and knowledge-intense industry well developed in Luxembourg and Wallonia with particular focus on finance sector in Luxembourg • In Luxembourg, the development of high-tech industries is only in its infancy (more and more projects are being funded and may lay the foundations for industrial development).	• High R&D spending (incl. private investment) in Rheinhessen-Palatinate • Luxembourg as a 'science region' faces a double challenge: 1) to remain attractive for highly qualified human resources (attract and keep human capital). 2) to ensure that research results are transferred into innovation (currently, the Ministry of Economy is working on a stronger coherence between research and innovation strategies). • The high share of multicultural staff in research institutions in Luxembourg forms the basis for high openness and creativity. • The situation of R&D spending in Luxembourg may have changed significantly recently (e.g better legislative framework to facilitate the investment of enterprises in R&D).	• In Luxembourg, RP, Saarland and northern Wallonia, there is a good knowledge potential that should be made use of for innovation activities. Thematic specialisation may be a way to pursue this. • In Luxembourg, the thematic specialisation is in the direction of biotech, green tech, material sciences and information and communication technologies. This specialisation fits with the overall orientation of the Greater Region. The TIGRE project showed that clusters in the Greater Region have similar thematic specialisations. • Entrepreneurship and creativity to using external knowledge are stronger in Lorraine and south of Wallonia.

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2. Policy implications for Luxembourg and the Greater Region

As there are other EU programmes in the field of innovation policy, the INTERREG programmes need to find their specific 'niche', i.e. the area where they can create added value with the type of projects they finance. The specificity of INTERREG is always the **cooperation aspect**, a focus on **regional development**, rather limited budgets compared to other EU programmes and usually the avoidance of funding pure research projects. More specifically with respect to RDI, it was suggested that greater clarity is needed on what INTERREG can and should achieve. So far, there seem to be diverging views on the programmes ability or inability to produce GDP growth. Still, there may also be other overall objectives beyond GDP growth. This needs to be discussed and defined in all INTERREG programmes. In order to do so, linking strategies and funds at international and to national levels is pivotal.

Two general 'niches' for the INTERREG programmes in the field of innovation policy were identified by the experts:

1. To improve **framework conditions** (e.g. governance, innovation systems, human capital, innovation strategies)
2. To **facilitate interactions between different actors of the innovation system**. As relevant actors, the following groups were identified: private business, research institutions, intermediaries (e.g. innovation centres, technology transfer offices) and the civil society. Supporting this interaction not only focusses on bringing together relevant actors, but also goes beyond and directly support specific transfer and innovation processes (e.g. help SMEs to absorb and progress research results, find new applications, market introduction).

Concrete measures in the field of innovation in the INTERREG programmes

Workshop participants also discussed what concrete types of measures should be supported by the INTERREG programmes. A more general remark was that the objectives and measures of programmes should always be streamlined and of very high coherence. Measures are never means in themselves, but a way to reach set objectives. This is why the development of the purpose, objectives and measures needs to be derived, funnel-like, from the overall purpose down to the very concrete actions. Additionally, the strong requirement in INTERREG for projects to create concrete products and/or processes makes direct causal links between these and the envisaged measures necessary. This is where more knowledge is needed to justify measures, especially "softer" forms of collaboration. Also more project monitoring (including after project end) would be helpful in this respect.
The ESPON/KIT project may be of help with a first attempt on framework conditions for the 5 different regional types identified. Regional preconditions were identified on the basis of the degree of knowledge and innovation produced in a region.

Supporting regional framework conditions through INTERREG

During the workshop and the subsequent round with questionnaires, several ideas were pointed out as to how relevant framework conditions that support regional innovation capacity can be enhanced and addressed by the INTERREG programmes:

- **Joined innovation strategies at interregional level.** Different economic development strategies coexist within the Greater Region (diversification in Luxembourg, re-structuring in Lorraine, "plan Marshall" in Wallonia) so that spill over effects may be very limited. It is crucial that regions find their own specialisation within the system of the Greater Region.
- **Development of human capital,** including formal education, training and creativity development, to make use of cultural diversity as a source for innovation and entrepreneurship.
- **Development of new structures and services** to access financing for innovation (e.g. venture capital).
- **Feedback on EU regulatory framework for innovation in firms** on which aspects are helpful, where have barriers been created (this would be less biased than similar initiatives from single sectors or companies).

Additionally, it was mentioned that ESPON could help in identifying the most relevant framework conditions for innovation much more than what has been done so far in order to support INTERREG programmes in finding the best suited interventions. This could also be done at the level of individual countries.

Facilitating the interaction between different actors in the innovation system

The workshop identified four relevant actor groups for cooperation related to innovation in the INTERREG programmes: **private business, research institutions, innovation intermediaries and civil society**.

Due to high share of SMEs in the Greater Region and their potential reluctance to share internal knowledge, innovation intermediaries play a strategic role in the Greater Region. In addition, Luxembourg benefits from its research institutions whose role in INTERREG projects has been emphasised by workshop participants.

Cooperation on innovation can – in theory – take place among actors within one of the three groups of researchers, business and relevant intermediaries, but can also focus on bringing them together. It also needs to be kept in mind that cooperation among researchers and cooperation among business are both already (partly) covered by other EU as well as national/regional programmes. With respect to involving research, INTERREG programmes are able to help with **making new knowledge accessible** (particularly relevant in regions with strong research institutions). With respect to involving private business, INTERREG programmes can **support the access to technology and innovation, enhance technological cooperation and improve market access for SMEs**. With respect to involving innovation intermediaries, INTERREG programmes can help **create or support platforms** that reinforce cooperation between the two other groups (research & business), assist in the adaptation of knowledge to the specific local context and to generally enhance complementarities and synergies between all groups and topics involved.

Cross-group cooperation can emphasise the creation of meeting platforms or can more actively engage in facilitating the transfer. Workshop participants and respondents to the 2nd round discussed the specific "niche" for the INTERREG programmes and identified the cross-group cooperation as most relevant in this respect. How much facilitation is required needs to be decided on a case-by-case and bottom-up basis. In some regions, cooperation can look back on a successful history and can continue at a high level, while in others, cooperation between the different groups needs to start from scratch and people will need to spend time getting to know each other and finding ways to work together.

In addition, it was mentioned that besides involving these groups in innovation projects, the INTERREG programmes should work with related **governance aspects**, e.g. means and methods for involving the actor groups and best practice for strong involvement.

Measures for involvement of private business

A variety of relevant measures were discussed for involving private business in INTERREG innovation projects. The highest agreement could be found on **supporting the access to technology, innovation transfer and technological cooperation. Some experts mentioned the importance of market access support for SMEs**.

Other relevant measures are relevant to a certain extent and include:

1. Financial instrument to support SME involvement (e.g. venture capital, guarantees);
2. Support entrepreneurship;
3. Identification of relevant and alternative value chains in relation to the regional thematic specialisation and in cooperation with neighbours. This may be particularly relevant in some regions while others may already have sufficient knowledge in this respect;
4. Facilitating cooperation with research and other actors (e.g. public). Due to cultural differences and different innovation and technological backgrounds, there may be differences in strategic objectives. This cooperation might be of particular relevance in some regions, where cooperation between the groups is still relatively new;
5. Sharing new methods and implementation of co-working schemes with the constraint that a rather limited number of companies are open to sharing these practices;
6. With respect to process innovation: the dissemination of the innovative approaches such as social cooperative or ecological working approaches may require support.

Measures for involvement of research institutions

The ESPON/KIT project states that both North-West-Europe and the Greater Region are in a dual situation. In both cases, about half of the regions are “creative regions” (e.g. Lorraine, large parts of Wallonia), while the other half are “endogenous regions” (e.g. Luxembourg). “Endogenous regions” are those with strong research capacity (highly qualified human capital and networking with other research regions), while “creative regions” are those with high entrepreneurship and fewer research activities.

“Endogenous regions” have attractive research infrastructures at their disposal and can use these to boost innovation. With respect to INTERREG cooperation, the question is what role research institutions should play and how they can best be used to increase regional innovativeness.

Workshop participants and respondents to the 2nd round mainly **highlighted the transfer of knowledge function** for research institutions. This allows for the bringing together of knowledge-intense regions with those that depend on external knowledge sources to innovate. It implies that the transfer needs to focus rather on **applied knowledge**. The workshop revealed, however, that there is a lack of knowledge on the strengths of the business landscape across borders. The focus of cross-border and transnational cooperation under INTERREG should thus be on **making use of existing knowledge for strengthening the regions’ innovation capacities.**

Several workshop participants also saw a role in which **research institutions are used for creating new knowledge in cooperation projects**. This would be mostly relevant in strong research institutions cooperating among themselves (“endogenous regions”), but could also apply in cases where – in the diversity of project partners and tasks – very advanced institutions use the cooperation platform to develop new knowledge, while others focus on transferring existing knowledge or to catch up on knowledge. This would therefore also do justice to the different strengths and potential roles of partners as well as to different options for involvement and activities.

Measures for involvement of intermediaries and civil society

Intermediary organisations can help to bridge the gap between research and business activities by acting as "brokers" and "translators" between the two groups, e.g. by adapting knowledge to the local context. It was mentioned that this may be particularly relevant to boosting **confidence** between the two groups working. At the same time, intermediary organisations can help to increase the complementarity of projects and to find synergies. These institutions play an important role with respect to innovation projects and should be included where appropriate. However, as they are usually in existence before the start of the project and have their own funding sources, INTERREG programmes should not be used to simply fund these institutions. Moreover, also other public institutions may also be of importance for innovation projects.
The involvement of the civil society (as part of the "quadruple helix") was mentioned by some participants. Their function for innovation projects is less direct, but in certain cases it may make sense to let the civil society (or specific target groups) test and validate innovation and to define real needs. For educational and motivational activities, the involvement of the civil society can be valuable, likewise for dissemination and outreach activities. However, the line between involving the civil society as such for specific target groups or not, is not that clear cut.

Coordination dimension

At the national level, the challenge is to ensure coherence between the national objectives for innovation policy and the objectives in the different EU programmes for cross-border, transnational and interregional cooperation (internal governance). The complementarity of funds is often not guaranteed.
Several workshop participants and/or respondents to the 2nd round emphasised the need for better coordination at the national level. In Luxembourg, there is a national exchange, but it was mentioned that a stronger thematic focus could be helpful to define what is to be achieved in each area (e.g. in the innovation field). Moreover, options for mainstreaming the INTERREG programmes with national and regional programmes could be made better use of with the help of stronger political cooperation. One idea mentioned during the workshop to better coordinate the different levels of funds was the example of the Upper Rhine programme, where INTERREG funds had been combined with regional funds in a joint call on joint priority areas.

Conclusion

ESPON results show that Luxembourg's strengths in the field of RDI rely mostly in its research institutions and human capital. As this emphasis on research is relatively new and remains modest compared to larger countries, it is essential to continue concentrating on the most promising technologies (e.g. biotech, green tech, material sciences and information and communication technologies). Luxembourg faces the challenge of reinforcing its ability to turn knowledge into innovation. Its economic structure relies mostly on services (esp. financial sector), while its enterprises are mainly SMEs.
The Greater Region's RDI profile is also mixed: with Saarland and Rhineland-Palatinate having a profile similar to that of Luxembourg while in contrast Wallonia and Lorraine are "creative regions". These latter are in entrepreneurship and the ability to turn research into innovation. One of the niches of the structural funds programmes could be to encourage the transfer of research into innovation and to encourage the exchange between the regions (for example in the INTERREG Greater Region framework). Similar measures could also be implemented within Luxembourg, especially to support SMEs. At the same time, exchange between regions with similar profiles is also of relevance. For Luxembourg, similar regions would include Île de France, most of Switzerland, Edinburgh and most of Austria.

More information

Sources of information on Research and Innovation in Europe

ESPON – KIT, (2012): Knowledge, Innovation and Territory, final report, espon.eu/KIT
ESPON – SIESTA (2012): Spatial Indicators for Europe 2020 strategy, draft final report, espon.eu/SIESTA
European Commission (2011): Innovation Union Competitiveness report, DG Research

Sources of information on Research and Innovation in Luxembourg and the Greater Region

European Commission (2011): Overall review of EU Member states and Associated countries, Country profile Luxembourg, DG research
Lacave, M. (2010): Expert evaluation network delivering policy analysis on the performance of cohesion policy 2007-2013, Task 1 : Policy paper on innovation, Luxembourg ; Report to the European Commission, DG Regio
TIGRE – transfert de technologies et innovation en Grande Région (2012): Clusters de la Grande Région 2012, Projet cofinancé par le programme INTERREG IVA, tigre-gr.eu

The ESPON programme

The ESPON 2013 Programme is part-financed by the European Regional Development Fund, the EU Member States and the Partner States Iceland, Liechtenstein, Norway and Switzerland. It supports policy development in relation to the aim of territorial cohesion and harmonious development of the European territory.

ESPON supports Cohesion Policy development with European-wide comparable information, evidence, analyses and scenarios on framework conditions for the development of regions, cities and larger territories. In doing so, it facilitates the mobilisation of territorial capital and development opportunities, contributes to improving European competitiveness, widening and deepening of European territorial cooperation and sustainable and balanced development.

More information on ESPON and all of the research outputs can be found on the ESPON website: www.espon.eu

The USESPON project

The USESPON project aims to encourage and support the use of findings from the ESPON 2013 Programme. It supports stakeholders across Europe by providing guidance on using ESPON results in policy-making and practice. For more information on USESPON, have a look at the project website: www.espon-usespon.eu

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