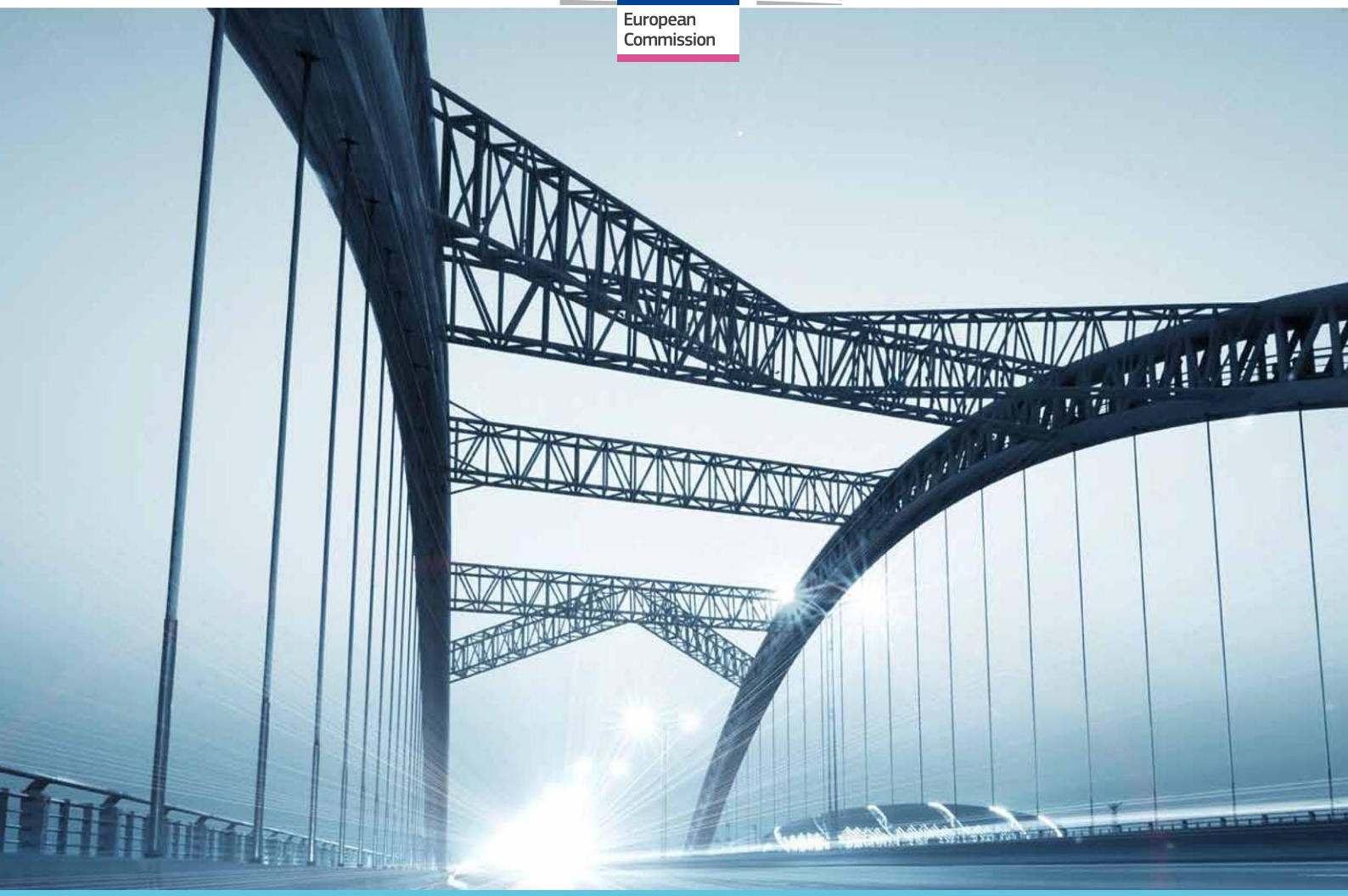
European Commission



ESIC European Service Innovation Centre

REPORT

Summary Assessment of the Province of Limburg

Prepared by:
Kincsö Izsak (Technopolis Group)
Martijn Poel (Technopolis Group)
Matthijs Janssen (Dialogic)
Bram Kaashoek (Dialogic)

October 2013

Enterprise and Industry

ESIC in Brief

Increasingly service innovation plays an instrumental role in the transformation and upgrading of traditional economic sectors and industries into more productive, competitive and high value-added business eco-systems. Considered as being multi-dimensional in nature, service innovation comprises innovation in services, service sectors or service industries that are provided by service entrepreneurs and service firms. It also takes place in manufacturing industries, adding further value and contributing significantly to overall productivity and profitability. There is a growing need to assess, analyse and demonstrate what impact service innovation has on industrial change and to assist Member States and regions towards a greater understanding of service innovation as a driver of industrial transformation and future competitiveness.

The European Service Innovation Centre (ESIC) is a two-year initiative commissioned by the European Commission's Directorate-General for Enterprise and Industry to capture and demonstrate the dynamics and large-scale impact of service innovation as well as to assess how service innovation impacts on competitiveness, industrial structures and regional development. It will also focus on assessing the implications and impacts of service innovation on employment structures, economic patterns and on value creation.

Primarily, ESIC will provide customised advice to six selected model demonstrator regions (the Canary Islands, Emilia-Romagna, Limburg, Luxembourg, Northern Ireland and Upper Austria). The initiative will also help other Europe's regions and Member States to make better use of the transformative power of service innovation in strengthening existing and emerging industries and markets and to develop better industrial policies and smart specialisation / cluster strategies. The goal of creating a favourable eco-system for service innovation will boost supportive infrastructures and business conditions that, in turn, will facilitate the take-up of innovative services throughout the economy.

This work is a part of a service contract for the Enterprise and Industry Directorate-General of the European Commission.

Table of Contents

This work is a part of a service contract for the Enterprise and Industry Directorate-General of the European Commission.

Introduction

A strong, healthy, high value-added services sector is essential for the efficient operation of a modern economy, for facilitating commercial transactions and for enabling the production and delivery of other high value added goods and services. Service innovation represents the systematic development, design and testing of new and/or improved service offerings, processes and business models, using multidisciplinary social science, engineering and technology-enabled models, methods and tools. As it addresses the whole economy and not only the service sector, service innovation is very relevant to achieving the EU2020 goals of smart, sustainable and inclusive growth.

In this context, the European Service Innovation Centre is instrumental in pointing up the innovation potential of service activities across Europe and supporting the assessment of how regions can both unlock their service innovation potential and increase their economic performance significantly.

The purpose of this summary assessment report is to assess whether the regional policy mix of Limburg is conducive to the emergence of new business sectors/models or the transformation of existing sectors/models via the application of a systemic policy approach. This assessment is complemented by a mapping of the economic change induced by service activities and service innovation an assessment of policy options and policy support measures. Based on the analysis, the report summarises the main findings and provides the basis for a peer-review process in which the findings will be validated with each model demonstrator region. These two steps will then form the basis for ESIC to provide practical policy recommendations on how to implement solutions and the tools and instruments that should be used to achieve the various objectives.

This report was prepared by Kincsö Izsak (Kincso.izsak@technopolis-group.com), Matthijs Janssen (janssen@dialogic.nl), Bram Kaashoek (kaashoek@dialogic.nl) and Martijn Poel (martijn.poel@technopolis-group.com). The contents and views expressed in this report do not necessarily reflect the opinions or policies of the Member States or the European Commission.

This work is a part of a service contract for the Enterprise and Industry Directorate-General of the European Commission.

The views expressed in this report, as well as the information included in it,
do not necessarily reflect the opinion or position of the European Commission and in no way commit the institution.

Executive Summary

The Province of Limburg in the Netherlands is one of the few regions in the EU with advanced policy thinking in terms of developing its manufacturing industry through service innovation. It has already demonstrated its capacity to transform the region from an old mining area into one that hosts a developed chemical manufacturing industry and it has an ambition to continue with the transformation into new, innovative fields.

Limburg has ample opportunities to develop service innovations, as several industrial clusters exist in which service innovation can drive the renewal of the regional economy. Many of the key industries in the Province are under pressure from increased global competition and hence these companies will need to make adjustments and changes to their business concepts.

The regional development strategy is centred on several regional knowledge hubs, which are:

- **Chemelot,** as a centre of the chemical industry and related materials including goods and services, clusters around DSM, a noted chemical firm;
- The **Health Campus** is related to the academic work of Maastricht University, the Maastricht Medical Centre and firms in the cluster of life sciences and health, chemicals and medical, precision and optical instruments;
- **Document Services Valley** originated in the machine and equipment manufacturing sector and is linked to logistics and ICT. It started around Océ in Venlo, which is now part of the international Canon Group;
- **Greenport** is related to the agro-food and horticulture cluster in the northern part of the province and is the logistic hotspot for the export of agro-food and horticulture products to Germany; and
- The **Smart Services Hub** is linked to specialised business services, financial services and public administration, in the Heerlen region where APG and CBS are also located.

The campuses are bringing their resources together in public-private partnerships and it is expected that these investments will lead to new start-ups and new knowledge-intensive jobs.

Nevertheless, service innovation in the region is mainly driven by some of the big companies, such as Océ Canon and DSM, and by the public sector itself through the University of Maastricht, APG, CBS and the campuses, whilst SMEs do not know much about this concept of service innovation as yet. SMEs need more examples and role models to become engaged and to step up their demand for integrating more innovative services in their business processes. Both the demand and supply for service innovation is concentrated in some industries and areas, which are not yet sufficiently interconnected across the region to exploit the full potential of such innovation.

Analysing the structural indicators, the statistical data reflects that Limburg performs close to the EU average on indicators assessing entrepreneurship and innovation and business model generation. It is, however, performing worse in financing innovation and some of the indicators related to knowledge development. It is better than the EU average in collaboration, specialisation in service-oriented clusters and companies with service innovations. Hence, knowledge development and transfer and financing innovation are two dimensions that deserve more efforts to explore and better understand the underlying barriers.

The ESIC Self-Assessment Tool reflects the fact that the regional policy mix has some of the elements of a systemic policy. Opportunities in service innovation are addressed in most of the functions of the innovation system. Besides concrete policy measures that aim to foster industrial structural change through service innovation, such as the Service Science Factory or the LimburgMakers, the existing horizontal policy measures are increasingly being broadened by integrating service innovation and manufacturing developments within an holistic vision. This is also a trend in 'Chemicals' – an industrial field that is quite strong in Limburg. In this field there is an increasing awareness of the importance of maintenance services, for example, and the availability of big data is a new source for analyses and advisory services.

On the other hand, the ESIC analysis identified the following areas that should receive more attention:

- **Knowledge development and transfer** is one area that should be better addressed in order to unlock the full potential of service innovation. In practice, this can mean continuing with the integration of service innovation related thinking in knowledge development programmes, such as university curricula and knowledge transfer schemes. It is important that future human resources are secured and have the requisite capabilities and also the motivation to stay in the region;

This work is a part of a service contract for the Enterprise and Industry Directorate-General of the European Commission.

- **Entrepreneurship policies** should be revisited. Although the structural indicators and the self-assessment indicate that the situation in this respect is fair, the current policy is too technology-oriented and does not take sufficient account of the potential of service innovation. This is even more pertinent and desirable for SMEs that are not yet engaged in the service innovation initiatives;
- **Collaboration and networking** should be strengthened so that there are not only service industry related initiatives but there is more interaction between the manufacturing and service sectors and also more cooperation across the campuses.

In terms of service-innovation thinking in regional policy, two parallel developments can be observed in the region. One of them is the increasing attention being paid to service innovation in service sectors, such as financial, administrative and document-based services. A second development in thinking in Limburg's innovation policy is the emerging understanding of services as being a source of competitive advantage for manufacturers and a fruitful source of cross-overs between campuses. This second perspective is the most recent and less detailed. ESIC has made the following observations and reflections on the large-scale demonstrator strategy of Limburg.

Campuses: exchanging lessons and exploring synergies

A key challenge for the Province of Limburg is to foster both specialisation in innovative themes through the campus initiatives and exploit possible synergies between them. Combining expertise in one domain with excellence in another domain requires actors to be involved in campus-initiatives, including the enterprises based at their sites, and also to be open to participating in initiatives that go beyond their current activities. This is also true for exploiting services developed on one campus by the firms that are active on another campus. However, this is not necessarily a technological or sectoral denominator. In order to create mass and exposure, campus management organisations should work together on their branding and share facilities, management structures and capital funds.

One services campus or better aligning on-going initiatives

When considering a services campus, in whatever form, it is essential to develop a strong strategy with respect to questions like: Which knowledge forms the core of this cluster? What can be gained from bundling it together in one campus, rather than striving for relevant expertise to be present in other, existing campuses/clusters? Does the value of a (smart) services campus mainly lie in its contribution to a broad range of sectors, or in its functioning as a 'gravity centre' for financial and administrative knowledge? Any consideration with respect to these questions should take into account the fact that service innovation is a cross-sectoral phenomenon. Since services are commonly part of a value chain, 'isolating' the corresponding knowledge in a separate campus might not be an obvious solution.

Thinking in complementary policy interventions

If the service innovation measures do not want to remain isolated islands, more needs to be done to integrate or link them into the mainstream regional innovation support programmes. This would represent a much bolder 'servitisation' strategy, which includes service innovation in all of the five innovation system dimensions of entrepreneurship, financing, knowledge development, innovation and collaboration, rather than fostering 'pure' services related to health or business services in just one of these dimensions. Such an increased holistic strategy would also enable a bigger impact to be made on the SMEs in the region. For the moment, these firms not sufficiently involved, despite the fact that service innovation represents an important opportunity to increase their competitiveness.

Service innovation enabled by new technologies and shared facilities

Services are not only driven by service concepts but are very much enabled by new technologies which are even more relevant in specific industries such as health-care that uses new diagnostic tools, chemicals with new environmental technologies based on which new services that can be offered to chemical companies or document management services that rely on ICT. When designing the policies, this interconnection must be understood. For instance, one of the tasks of the Service Science Factory could be to provide more knowledge in this respect. The Factory, with the participation of actors from Limburg, could also explore the options in Horizon 2020 for funding research and innovation that contributes to servitisation and ensure that relevant results from European programmes are shared with actors from Limburg.

More efforts to engage SMEs in service innovation

Service innovation in Limburg is mainly driven by some of the big companies, such as Océ-Canon and DSM, and by the public sector itself, whilst SMEs are less focused on service innovation. More concrete measures could be launched to involve SMEs in service-innovation related initiatives, such as awareness-raising campaigns, innovation vouchers or innovation prizes.

Consider the appropriate number of focal points

The profile of the region becomes less clear if there are too many focal points. On the one hand, the many service innovations and other developmental initiatives that are on-going should be welcomed and the variety within the province itself should be understood but, on the other hand, focusing on too many developmental priorities might weaken the competitive position of the region. This is why it may be wise to reconsider the focus for a large-scale demonstrator strategy.

Addressing the European/international dimension

Many of the market and enabling factors that can help to unlock the potential in service innovation lie beyond the borders of the Province of Limburg. Policy-makers in the region recognise that cross-border cooperation between German, Belgian and other Dutch regional policies is of the utmost importance. Better exploitation of the opportunities of an internationally open region needs further reflection on how, and in what form, related policies might be improved. For instance, new arrangements might be made in terms of insurance for expatriate employees, taxes for cross-border commuters or pension schemes. This might also be a potential area that could be better explored by the Smart Services Hub.

1. The Challenge

The Province of Limburg is one of the few regions in the EU with advanced policy thinking in terms of developing its manufacturing industry through service innovation. It has already demonstrated its capacity to transform the region from an old mining area into one that hosts a developed chemical manufacturing industry and it has an ambition to continue with the transformation into new, innovative fields. The regional development strategy is centred on regional knowledge hubs like the Chemelot campus, the Maastricht Health campus, and the recently established Greenport Venlo. The campuses are bringing their resources together in public-private partnerships and it is expected that these investments will lead to new start-ups and new knowledge-intensive jobs.

The region has recognised many opportunities in services. For instance, Canon-Océ launched the Document Service Valley and a Business Services School, while triple helix collaboration in Heerlen led to the creation of a Smart Services Hub. Another example is the Service Science Factory at Maastricht University, where academic knowledge is applied to service design projects.

There are, however, several challenges that the Province of Limburg has to face, as indicated in the application document submitted by the Limburg Provincial Government in response to the ESIC call.

Although the Province boasts several large and innovative multi-national enterprises and has a relatively strong manufacturing industry, it will not necessarily remain competitive in the future. **The manufacturing industry in the region is facing growing commoditisation and there is a need for new forms of added value.** Rising costs, product complexity, short time-to-market and its product-orientated culture make the manufacturing industry vulnerable. The results of the core areas should also be translated into other parts of the industry. Service-focused centres are emerging within the region driven by local players, like Océ, Canon and UM, but supported by Province of Limburg. The main question is: how can these centres be aligned with other initiatives to make the Limburg economy more service-oriented?

Secondly, **the regional ecosystem is fragmented**, due to the diversity of the businesses and sectors operating within it, and thus, these businesses and sectors rarely strengthen each other's core products and fail to achieve sufficient advantages of scale. The campuses, for instance, are disconnected and exist as 'islands on their own' and hence they would need to have a common denominator in order to create the critical mass. Of primary importance in Limburg's innovation policy is the support for manufacturing-based campuses. The questions that occupy the Province of Limburg in this respect are: how can forces related to the campus-initiatives be bundled? And how can companies and enterprises be connected in such a way that more knowledge-intensive industrial services emerge?

Thirdly, the Province is embedded in a wider economic environment that could offer more opportunities such as increased cooperation with Germany or with the Brainport region in the wider Eindhoven area, including Noord Brabant in the Netherlands and Zuid Brabant in Belgium. In order to **unlock these cross-border opportunities**, more international cooperation and more strategic cross-border thinking are needed.

The transition from a high-tech manufacturing industry to industrial business services is not a trivial one. It requires a different culture, a different innovation process and a different development cycle. Despite the fact that there is a growing awareness and several initiatives in progress, there is still not enough experience. The service innovation initiatives are young and there are concerns about how to foster collaboration between manufacturing and service industry firms and how to deal with the international dimension.

2. Regional Performance and Potential

2.1. Socio-economic context for service innovation

General socio-economic situation

The province of Limburg is the most southern and, perhaps European, province of the Netherlands, sharing its borders with Germany and Belgium, and being close to Brussels. The number of inhabitants is 1.1 million and this represents 6.8% of the Dutch population. Limburg's contribution to the Dutch GDP is around 6%, which is less than that 6.8%. This provides a first indication of Limburg's socio-economic challenge. A second indication is that between 2000 and 2008, Limburg was one of only three Dutch provinces with a negative annual growth rate of 3%. In Limburg, GDP per capita decreased to 31,600 Euros in 2010, which still makes Limburg a prosperous region, compared to a EU-27 average of 24,500 Euros in the same year. A third indication is that the population of Limburg decreased slowly between 2002 and 2008 by 1.7%. This is in contrast to provinces in the Western part of the Netherlands. However, from 2008 onwards, the number of inhabitants of Limburg has been stable. This is due to immigration from Germany, Poland and other countries but there has also be emigration of some of the Province's young people. Unemployment figures also provide a nuanced picture. Short-term and long-term unemployment figures for Limburg are close to average figures for the Netherlands. Between 2006 and 2011, total unemployment in the Netherlands was between 5% and 6% of the working population. During the recent economic recession, this figure increased to 8.3% for the Netherlands and to 8.5% for Limburg.

The socio-economic situation in Limburg is influenced by the closing of the mines in the late 1960s and early 1970s. Mining accounted for over 10% of the jobs in Limburg. Also, employment in agriculture declined due to automation. The national and regional governments undertook several initiatives to create new employment opportunities in Limburg. A number of public agencies, such as the Statistical Office (CBS) and the organisation for managing the pension fund for government employees (ABP), moved to Limburg. In addition, budgets were made available to stimulate firms to move to Limburg or to continue innovating and growing in Limburg. For example: the former Dutch car manufacturer DAF originated in Eindhoven and opened it second factory in Limburg in Born in 1968; a regional development and investment agency (LIOF) was created in 1975; and Maastricht University opened in 1976 and developed into a multi-disciplinary university with over 3,000 staff members.

Sectoral structure

Due to a combination of endogenous developments and public policy, the Limburg economy contains a variety of manufacturing and service sectors. A recent study (Berenschot, 2013) provides a detailed overview of the manufacturing sectors and also addresses the service sectors. At an aggregated level, manufacturing is the largest sector, representing 5.2 billion Euros out of a total of 30 billion Euros (2011). Due to the limitations of data at a disaggregated level, the relative importance of specific manufacturing sectors is based on a survey of firms in Limburg. Additional indications are provided by statistics about the Netherlands and information about firms in Limburg. The following manufacturing sectors are most substantial in Limburg:

- Automotive;
- Chemicals and chemical products;
- Machine and equipment;
- Manufacturing of food products;
- Medical, precision and optical instruments;
- Metal products;
- Rubber and plastic products.

The study mentioned above explains that the majority of firms from manufacturing sectors in Limburg are original equipment manufacturers, providing innovative components, equipment, specialised services and

integrated systems to large-scale manufacturers, business clients and consumers. Some manufacturing sectors, such as (basic) metallic products and rubber/fertilizers, are not considered as high-tech sectors, because their activities are restricted to providing materials and basic components upstream in the value chain. Two service sectors in Limburg are mentioned as contributing, to some extent, to high-tech systems:

- IT services;
- Specialised business services, e.g. architects and design (cf. creative industries), engineering services, research and translation services.

The eight main service sectors in Limburg, in terms of added value, are:

- Education;
- Energy production, distribution and trade;
- Financial services, e.g. financial support for logistics processes;
- Health and social work;
- Public administration;
- Real estate;
- Transport and storage;
- Wholesale and retail trade.

Tourism is an important activity in Limburg, with employment and added value spread across several sectors such as retail, restaurants, real estate, culture, sports and recreation. The construction sector represents 1.5 billion Euros of Limburg's added value, whilst agriculture, forestry and fishing account for only 0.4 billion Euros.

Economic activities in Limburg interact with economic activities in the rest of the Netherlands, such as the high-tech cluster in Eindhoven, as well as economic activities in neighbouring regions in Belgium and Germany, such as health firms and research in Louvain, Belgium and chemical firms and research in Aachen. In addition, economic activities continue to be influenced by policy. The main example at national level is the 'top sector approach'. These top sectors are agri-food, creative industry, horticulture, life sciences and health, water, high-tech, logistics, chemicals and energy.

The economic, social and innovation priorities of policy-makers in Limburg will be addressed in the remainder of the paper. By means of introduction, the following five priority clusters/campuses can be mentioned (please note that the campuses are presented more in detail in section 2.2).

- **Chemelot,** as a centre of the chemical industry and related materials including goods and services, clusters around DSM, a noted chemical firm;
- The **Health Campus** is related to the academic work of Maastricht University, the Maastricht Medical Centre and firms in the cluster of life sciences and health, chemicals and medical, precision and optical instruments;
- **Document Services Valley** originated in the machine and equipment manufacturing sector and is linked to logistics and ICT. It started around Océ in Venlo, which is now part of the International Canon Group;
- **Greenport** is related to the agro-food and horticulture cluster in the northern part of the province and is the logistic hotspot for export of agro-food and horticulture products to Germany; and
- The **Smart Services Hub** is linked to specialised business services, financial services and public administration, in the Heerlen region where APG and CBS are also located.

Limburg's innovation system

Table 1 provides an overview of Limburg in terms of the five functions of innovation systems, as defined in the ESIC Concept Note. In short, when all five functions are in place, and when they are aligned in terms of priorities, timing and quality, innovation will thrive and firms and other types of actors will benefit. In

discussing the main outcomes, examples will be provided for sectors and innovations that are high on the policy agenda of Limburg.

Table 1: Five functions of the innovation system in Limburg (indicators from the European Service Innovation Scoreboard)

Function of innovation system	Structural indicators	Regional Value	EU 27 average	Dynamics/Change 2005-2011
Entrepreneurial activities	Share of self-employed people (2011) (%age total employment)	12.9	15.1	+15% increasing
	Share of people who think it is important to try new and different things (2010)	0.41	0.42	
	Share of people who think it is important to being creative (2010)	0.54	0.54	
	Labour productivity growth (2000-2010)	+2.37	2.20	
	New business formation in the region	2200 new business/year	-	
Knowledge development and transfer	Share of employees with a higher education degree (in %age) (2011)	27.1	30.4	+7% increasing
	Share of researchers among employees (in %age) (2011)	0.24	0.34	
	EPO patent applications (per million of population) (2008)	201	115	
	EPO high-tech applications (per million of population) (2008)	19	18	
Innovation and business model generation	Business expenditure on R&D (BERD) (%age of GDP) (2011)	58.7	61.3	-17% decreasing
	Employment share in medium-high-tech and high-tech manufacturing (2010)	5.72	6.39	Stable
	Employment share in knowledge intensive services (2010)	38.77	35.32	+6% increasing
	Employment share in service innovation intensive industries (2010)	3.73	4.85	+3% increasing
	Companies with service innovations (in %age) (2010)	15.8	8.1	
Financing innovation and growth	Gross Fixed Capital Formation (%age of GDP) (2011)	14.5	-	
	Total expenditure on R&D (GERD) (change in the %age of GDP) (2010)	1.50	1.68	-25% decreasing

	Business expenditure on R&D (BERD) (%age of GDP) (2011)	58.7	61.3	-17% decreasing
	Availability of seed and venture capital	Rated as fair on the SAT	-	
Collaboration and networking	Share of innovators collaborating with others (in %age) (2010)	15.5	9.9	
	Specialisation in service-oriented clusters (2010)	1	-	

Table 1 indicates that **entrepreneurial activities** in Limburg are close to the European average. The relatively low share of self-employed people can be explained by the sectoral structure, with several manufacturing sectors and only few service sectors, such as specialised business services, that are known for accommodating self-employed people and very small organisations. When comparing the number of start-ups in Limburg with the total number of start-ups in the Netherlands, the scores of Limburg are consistent with the relative importance of Limburg for the Dutch economy, which is around 6% of the GDP. Between 2009 and 2012, the number of start-ups in manufacturing in Limburg was around 300 per year, which is between 6 and 7% of manufacturing start-ups in the Netherlands. In the same period, the number of start-ups in Limburg in business services was around 1900 per year, which is around 5% of the professional services start-ups in the Netherlands. A nuanced picture also emerges from a recent study about Limburg's economy (Berenschot, 2013). This study is partly based on a survey and contains few comments about entrepreneurship being a barrier to innovation, or entrepreneurship campaigns being needed.

Knowledge development and transfer in Limburg also scores comparably to the European average. The exception is that Limburg scores highly in patent applications submitted to the European Patent Office (EPO). This can be explained partly by the substantial volume of manufacturing activities in for example, chemicals. Overall, Limburg's average score for knowledge development and transfer is confirmed by the recent study of the Limburg economy. Concerns about R&D expenses of business and governments are most explicit for the agro-food, the chemical and the automotive sectors but they are less of concern for the health sector. In terms of knowledge diffusion, survey respondents mention that they collaborate with universities and other external partners. However, 25% of respondents report human capital, including internal knowledge, and the availability of external knowledge as important barriers to innovation. This is also reflected in the indicators 'share of employees with a higher education degree' and 'share of researchers among employees', both of which are below the EU average.

Innovation and business model generation in Limburg has a score comparable to the European average, but the share of companies with service innovation, as a % of total companies, scores well above the European average. This indicates that service firms in Limburg are innovative and/or that manufacturing firms innovate by providing service-goods bundles, integrated solutions or providing their goods as services through servitisation. Figures on BERD are confirmed by the recent study about Limburg. R&D expenses by business in Limburg are below the Dutch average. Adding services to goods is mentioned as one of the main opportunities, besides internationalisation, flexible and modular goods, using new materials and reducing waste volumes.

Few structural indicators are available for **financing innovation and growth.** Figures for the Netherlands (2008-2011) indicate that venture capital invested in the Netherlands, which was around 0.10% of the GDP, was very close to the European average and, for example, higher than in Germany but lower than in the UK. In the recent study on the Limburg economy, which took place during the financial crisis and economic recession, survey respondents cite access to financial resources as being the number one barrier to innovation and growth. This holds especially true for SMEs.

Structural indicators suggest that **collaboration and networking** in Limburg is above the European average but the recent study on Limburg provides a mixed message. There are differences between established sectors, and their clusters or valleys, such as chemical and automotive, and emerging sectors in

Limburg, such as health. According to the European Cluster Observatory, Limburg has three 2-star clusters. This rating refers to the size of clusters and the level of specialisation in a region, on a scale of 1 to 3. In 2010, these clusters were 'Chemical products', 'Jewellery and precious metals' and 'Sporting, recreational and children's goods'. Having three 2-star clusters is similar in the other demonstrator regions, but above that of the most similar regions. The relevance of chemical products for Limburg has already been described. Jewellery is a highly specialised sector, with activities in Maastricht and other parts of Limburg but because of its small size, jewellery and precious metals did not appear in the list of main sectors. The category 'sporting, recreational and children's goods' includes several activities, which have been developed in the region, primarily for tourists.

The communication and **infrastructure** endowments of Limburg are good and provide the essential connections in all main directions, to Amsterdam, to Rotterdam and to Brussels.

Besides the average regional assessment along the five innovation dimensions, it should also be mentioned that the innovation system of the Province of Limburg is somewhat imbalanced in geographical terms.

2.2. Regional benchmarking

ESIC demonstrator regions, such as Limburg, are benchmarked against European regions that are similar on a number of economic indicators, including industrial structure and GDP. Data from 2000 to 2011 is provided in Appendix D and Figure 1 provides a summary based on data from 2011, or in some cases 2010.

The selection of most similar regions was based on similarities between industrial structure and levels of GDP per capita.[1] As a result of this exercise, the most similar regions to Limburg are: BE: Province of Liège, DE: Brandenburg – Nordost, DK: Sjælland, NL: Friesland, NL: Drenthe, UK: Tees Valley and Durham, UK: Northumberland and Tyne and Wear, UK: West Wales and The Valleys, and UK: East Wales.

In this section, the main issues for R&D and innovation are explained briefly and, in addition, the number of well-established clusters is addressed.

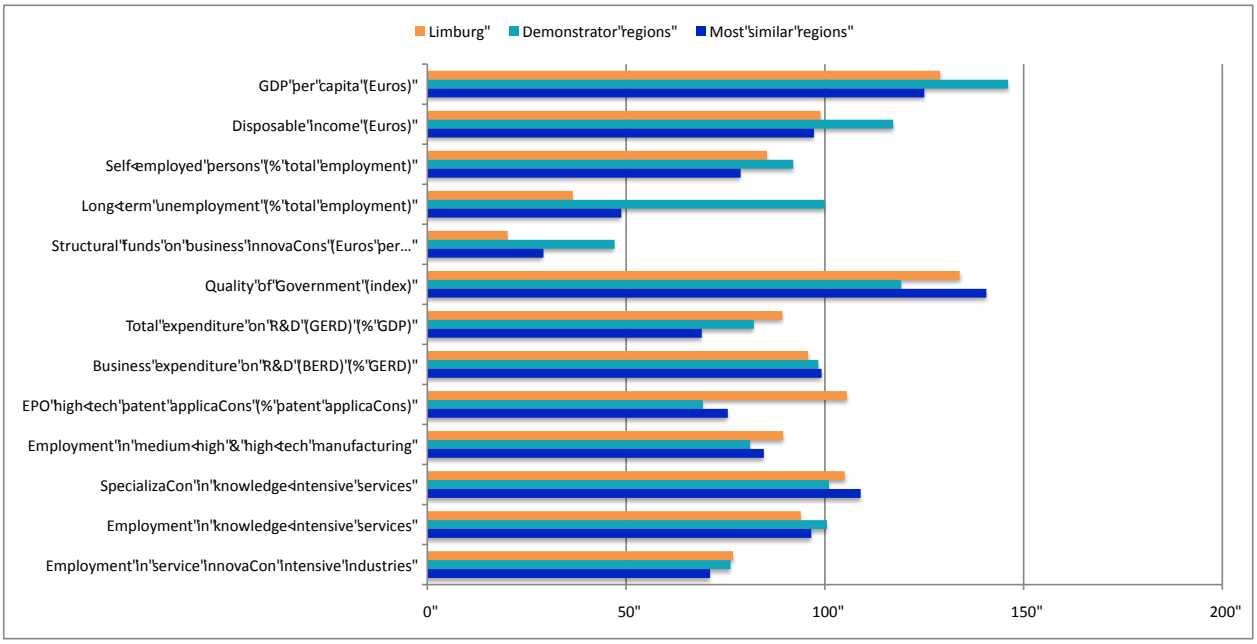
In Limburg, total expenditure on R&D, as a % of GDP is 1.50% and that is below that of the EU27, which is 1.68%, but above that of the demonstrator regions at 1.38% and most similar regions at 1.16%. Almost 60% of total R&D is spent by the business sector, a share comparable to that in the other regions.

[1] For identifying these most similar regions the average employment shares have been calculated for 2008-2011 for NACE Rev 2 industries for all regions. The nine regions with the smallest sum of the squared differences between these employment shares and the demonstrator region are the "most similar regions" with respect to their industrial structure. Similarly, the nine regions with the smallest double-squared difference between 2006-2009 per capita GDP (in purchasing power standard) and the demonstrator region are the "most similar regions" with respect to income. These two similarity indexes are combined by taking their weighted average with the weight for industrial structure equal to 90% and that for GDP per capita equal to 10%.

The number of patent applications per million of population is 200.78 is figure is comparable to that of the demonstrator and most similar regions but well above that of the EU27 at 114.99. The share of **high-tech patents**, which is 18.7%, is above average.

The share of **employment in medium-high and high-tech manufacturing** of 5.0% is comparable to that of the EU27 with 5.6% and the other regions. The **employment share in knowledge intensive services** of 32.8% is also comparable to the EU27 average that, in this instance is 35.0%. However, employment in service innovation intensive industries at 3.7% is below the EU27 average of 4.9% but similar to the demonstrator regions that have 3.7% and the most similar regions with 3.5%. Between 2000 and 2010, the region experienced a decrease of 0.2% in the employment share in knowledge-intensive services, whereas other regions reported an increase. Employment in service innovation intensive industries has also decreased over the same time period by 0.4%. A relevant point for the interpretation of data about employment and unemployment is that growth in labour productivity has been positive at an average rate of 2.4% during the time period 2000-2010. This is above the rate of all other regions (see Appendix D). Part of the explanation lies in the automation of the manufacturing and service sectors.

Figure 1 - Index-based benchmark of Limburg: EU-27 is 100



The quality of government is perceived to be high in Limburg. The region has an average degree of autonomy and decisions on regional policies are taken by the Province of Limburg together with the national government. However, decisions regarding innovation policy and structural fund allocations are centralised and taken by the national government, after consultation with regional policy-makers.

Limburg attracts 647.6 non-resident tourist arrivals per 1,000 of its population. This figure is well above the figure of 450.2 for the most similar regions and the EU27 average of 565.6. Limburg also attracts more international students at 5.5 per 1,000 of population compared to the demonstrator regions with 2.7 and the most similar regions with 2.3.

2.3. Opportunities and demands for service innovation

The Province of Limburg has ample opportunities to develop service innovations as several industrial clusters exist in which service innovation can drive the renewal of the regional economy. It has specific service-oriented industries as discussed above and the eight service sectors with the largest added value. There is also an incipient awareness in manufacturing firms of the need to further exploit the potential of service innovation to protect their competitiveness. Many of the key industries in the Province are under pressure from increased global competition and hence the companies need to make adjustments and changes in their business concepts.

Nevertheless, service innovation in the region is mainly driven by some of the big companies, such as Océ-Canon and DSM, and by the public sector itself through the University of Maastricht, APG, CBS and the campuses, whilst SMEs are less focused on service innovation. SMEs need more examples and role models to become engaged and to step up their demand for integrating more innovative services into their business processes. Both the demand and supply for service innovation is concentrated in some industries and areas, which are not yet sufficiently interconnected, and so the region is not yet exploiting the full potential of service innovation.

The demand for hybrid product-service innovations comes mainly from companies in the office-printing and copying industries and the document management industry that is emerging and is based on machine and equipment manufacturing and also from companies in the chemicals industry that are experiencing a slow development of service industry start-up firms around them. In addition, there is also a potential to make transformations in the sectors of agro-food and health industries such as tooling, devices, monitoring and clinical trials and, although it is not a particular focus of current policies, in sports and recreational industries.

The supply for new service-based business models is driven by the financial and administrative service firms, logistics, engineering and environmental consultancy firms, and it is fuelled by the knowledge-base on service innovation created in the University of Maastricht.

Service innovation also has a specific characteristic linked to the types of regional industries. As the specific industrial examples below highlight, developing new hybrid products relies not only on new service concepts, as it is often enabled by new technologies such as analytical and testing facilities, big data and environmental and safety technologies. In other words, new services can be added that are enabled by new technological developments. New services can be built on data such as monitoring systems for maintenance services of production facilities in the chemical sector, or using health data for health advisory services or specific diets in hospitals. This intertwined relationship between high-tech and service concepts is a specific aspect of some of these industries and is something that should be kept in mind.

Office printing, copying and document management

In the area of Venlo, there is a concentration of companies around office printing, copying and document management that is led by Océ-Canon. The industry concentrates on the development of processes in which printing of paper is being replaced by the use of digital technology. The new start-ups that are emerging are in domains such as imaging, big data or marketing, for example, by designing loyalty programmes.

As the traditional printing and copying industry has been under pressure given the fact that consumers are increasingly favouring digital alternatives, Océ has been moving more and more towards developing new service offerings. As Océ points out in its annual report *"organisations spend about 10 euro cents on the printing of a document, and invest 90 euro cents in the management, storage, transfer and retrieval of a document".* In recent years, revenues from these services have been growing steadily.

The development of new services related to documents has become one of the important growth markets in Limburg. New service innovations in this domain are also connected to new ICTs and new infrastructure. For instance, high-computing facilities are necessary enablers for developing new ways of document recording and safe storage.

This new document management industry is an emerging industry growing out of seed bed established by the experience and skills of existing machine and equipment manufacturers. It is also an asset that can be

used in other parts of the region's industrial fabric such as in health industries or in chemicals. Thus it represents an important opportunity to be exploited in the future.

BOX 1: THE EMERGING DOCUMENT MANAGEMENT INDUSTRY

The history of the emerging document management industry in the Province of Limburg goes far back to 1857 when Lodewijk van der Grinten, the founding father of Océ, started a pharmacy in Venlo. After its initial developments and innovations in butter colouring and blueprint materials, the company moved on to offer innovative print and document management products and, even later, to provide on specific document management services to its customers. Today Océ, a part of the Canon Group, is a global leader in printing.

Research and innovation has been a key focus of Océ since its beginning. In 2009, Océ invested approximately 8% of its total revenues, or €225 million, in R&D. In Limburg it concentrates on the development of cut sheet and wide format printers and scanners, strategic consumables, such as toners and photoconductors, and software.

However, Océ did not simply continue to be a manufacturer of products. It realised quite early on that one of the emerging business areas that could safeguard its future competitiveness was the non-paper electronic document and service domain. It bought the firm Imagistics International in 2005, which was a reseller of office copiers and was also specialised in the direct sales of faxes and copiers, and this firm became the Océ Digital Document Solutions division. Shortly afterwards, the Canon Group also established the Endowed Canon-Océ Chair in Business Services Innovation.

This service innovation model did not stay locked within one company. Océ founded an incubator for document services called Document Services Valley, in 2011. Because Océ decided to forge working partnerships with key players from the business community and knowledge institutes, it had an impact not only on its own evolution but affected the wider regional business eco-system. This open innovation model has enabled Océ to identify complementary innovation capacity and to foster a partnership approach to the development of new products and services.

Beside Canon-Océ, it is the Province of Limburg and Rabobank Venlo that finances Document Services Valley. The role of the Province of Limburg is to stimulate the regional knowledge-based economy and Rabobank Venlo invests in emerging businesses.

Since its launch in 2011, 86 business start-ups have been facilitated by Document Services Valley and its regional Programme for Acceleration or Document Services Innovation (PADSI). The PADSI programme offers three phases that provide both financial and intangible support. In return, the start-up must form a private company and offer 6% of its stock to Document Services Valley.

For more information see: http://global.oce.com/oce-innovation/default.aspx

and http://documentservicesvalley.com/

Chemicals and materials industry

The chemical industry, like many other industries, is under great pressure from globalisation and if its big players do not develop new higher added value services and new innovative products, they might have to scale down or de-locate. In some instances, production capacity is already moving to eastern Europe.

Structural change in the chemical industry is very much R&D and technology driven. It seems that the demand for services is focused on new technical and eco-innovative solutions, on collaborative services with universities and research institutes and on breeding new ideas through cross-sectoral collaboration, such as the development of bio-based materials.

New service concepts foster the growth of emerging new niches within the chemicals industry. The key services that enable new innovations are access to new testing facilities and consultancy on new engineering, technical and eco-solutions. For instance, DSM Resolve is a new spin-off company of the DSM chemicals multinational that has moved towards becoming a provider of advanced analysis. It grew out of the history and experience of the industry in the region, but now it is a separate service industry firm. DSM Resolve offers R&D support to customers, for instance, in polymers, chemicals, life sciences, and scientific

instrumentation and thus, it helps them to find innovative and sustainable solutions to their industrial challenges.

There is also a room for new service-concepts in the area of quality and health and safety solutions. As there is a growing tendency to favour environmentally-conscious products, this area is becoming more and more relevant. For instance Intertek, a leading provider of quality and safety solutions serving a wide range of
industries around the world, has extended its long-term relationship with SABIC in Geleen, one of the world's largest petrochemicals manufacturers. The contract extension positions Intertek as a strategic supplier of testing, inspection and analytical laboratory services to SABIC. Intertek has provided pilot plant testing and related services support to SABIC for many years at Geleen, in the Netherlands, which is a key petrochemical hub and is home to SABIC's European plastics production. Since then, Intertek has extended its support for SABIC by providing support across a wider range of products and locations.

A recent initiative from 2012 is the Enabling Technologies B.V, a joint venture of DSM Resolve, Maastricht University/MUMC+ and the Province of Limburg, which is offered both on Chemelot Campus and Maastricht Health Campus. It offers high-end analytical equipment, such as advanced light and electron microscopes, NMR, and mass spectrometers. It provides access to equipment, which SMEs cannot afford to buy for themselves and also helps SMEs to interpret the results of their measurements.

Health industries

Demand for service-oriented business models is also present in the health hub of the Province of Limburg, as new firms are starting up around the Academic Hospital of the University of Maastricht. For instance, one spin-off from the university is a firm that calculates doses of substances and there are other initiatives in the area of clinical trial services and also in diet advice based on genetic analyses. Among the institutes that drive life sciences developments in the region are the Maastricht University Hospital AZM, Aachen's University Hospital Klinikum and the German University of Technology, RWTH in Aachen.

An opportunity for service-innovation that could be driven by the linkages between the health and document service industries is imaging and big data. Producing chemicals and conducting health research both involve continuous streams of large amounts of data that need to be stored, secured, analysed and presented in a meaningful way.

Agro-food

The agricultural and food sector is also one of the strong points of the region. Limburg is the largest horticulture region in Europe with 3,400 horticulture companies that employ around 24,000 people (LIOF, 2013) and around 60% of its surface area is used for agriculture. The companies in the sector focus on food processing, feedstock, seed technology and horticulture and are also active in fresh produce, packaging, machines and automation. The transformation of this industry is linked to new consumer concepts, new logistic models and bio-based, healthy products that provide a demand for new service innovations. The connection of the agro-food industry to the health industry and to logistics may offer a potential for new developments.

Financial and administrative services

On the supply side of service-based solutions, Heerlen is becoming the focal point for financial-administrative and information-processing services. Today, Limburg has around 67,000 financial and/or administrative staff and several new job openings are expected in this domain during the period 2011-2016 (KennisAs, 2013). Business services represent one of the growth sectors in Limburg and the expected growth of the sector's economic value was 2.1% for 2013. However, there is a mismatch between the required workforce and available workforce.

Organisations that committed themselves to this area are, for instance, banks, insurance-providers, Statistics Netherlands and the Dutch Tax Agency. The presence of large companies and institutions such as APG, a pension scheme provider and administrator, the Tax Administration and the Central Bureau of Statistics (CBS) is driving these developments. Other smart financial services in Heerlen include Obvion, a

mortgage intermediary and part of the Rabobank Group. Nevertheless, local firms, and mostly SMEs, have not yet exhibited any demand for support in developing these type of services.

Logistics

Another aspect that receives substantial attention is logistics and this aspect is internationally known for being a stronghold of Venlo. One example of an opportunity is the attraction of more frozen traffic through Venlo, by creating sustainable storage such as freezers and fridges. Also, easing the crossings of borders with cargo is something which might need some innovation. Logistics is very much connected to the strong Dutch agri-food and horticulture sectors and together these sectors also form a network of regional clusters.

Logistics is an area that could be better connected to other initiatives and DSV could envisage more innovation with respect to the flows of administrative documents that are associated with international transport. A knowledge-base on developing service-based business concepts is also available through the University of Maastricht and through some key consultancies.

Sports and recreational industries

As mentioned earlier, the Province of Limburg has substantial economic clustering in the sports and recreational industries, which is linked to the importance of tourism. South Limburg, especially, is offering numerous tourist-related activities. The area of Sittard-Geleen is the region's epicentre for sports and leisure including cycling, handball, athletics, triathlon, table-tennis and football. Several sport related businesses, associations and educational and healthcare facilities are the drivers behind this industry.

The international dimension

As a last point in the analysis, it has to be mentioned that the market for many of the products and services of the Province of Limburg is very much linked to Germany and regions in other countries. As a result, the potential for service innovation cannot be treated only in provincial or national terms. There is a need to cover the market of the Province of Limburg together with the markets of Nord-Brabant and Nord-Rhein-Westphalia and hence, the policies should be also overarching. A strength of the Venlo area is, for instance, its proximity and connection with 'Das Ruhrgebiet' in Germany.

BOX 2: FROM MANUFACTURING TO SERVICE INNOVATION – THE EXAMPLE OF VEKOMA

Vekoma Rides Manufacturing is based in Vlodrop in the Province of Limburg and designs and builds roller coasters and other thrill rides. The company grew out of an agriculture machinery and mining equipment firm, founded back in 1926. After the decline of the mining industry, Vekoma started to produce roller coasters and indoor rides for amusement parks.

In the late 1990s, it launched a new service concept and became involved in innovative projects that aimed to create even better experiences for its customers through new simulation technologies. For instance, together with Brogent Technologies, Vekoma designed the 'Panoramic Flight Simulator Attraction' for amusement parks and shopping malls.

Another invention of Vekoma is the Madhouse that is able to disorient members of the audience by creating both a sense of weightlessness and of being spun upside down. The basic unit that creates this physical and optical illusion contains several rows of seats that are attached to a swaying gondola within a rotating drum. Features, before or during the show, build up the suspense. For example, a magician might cast an imaginary spell over the audience and then the seats will rock and the room revolve during the show, in fulfilment of this spell. In combination with launching new service concepts, Vekoma continues to improve its after sales services such as installation, training, monitoring and maintenance.

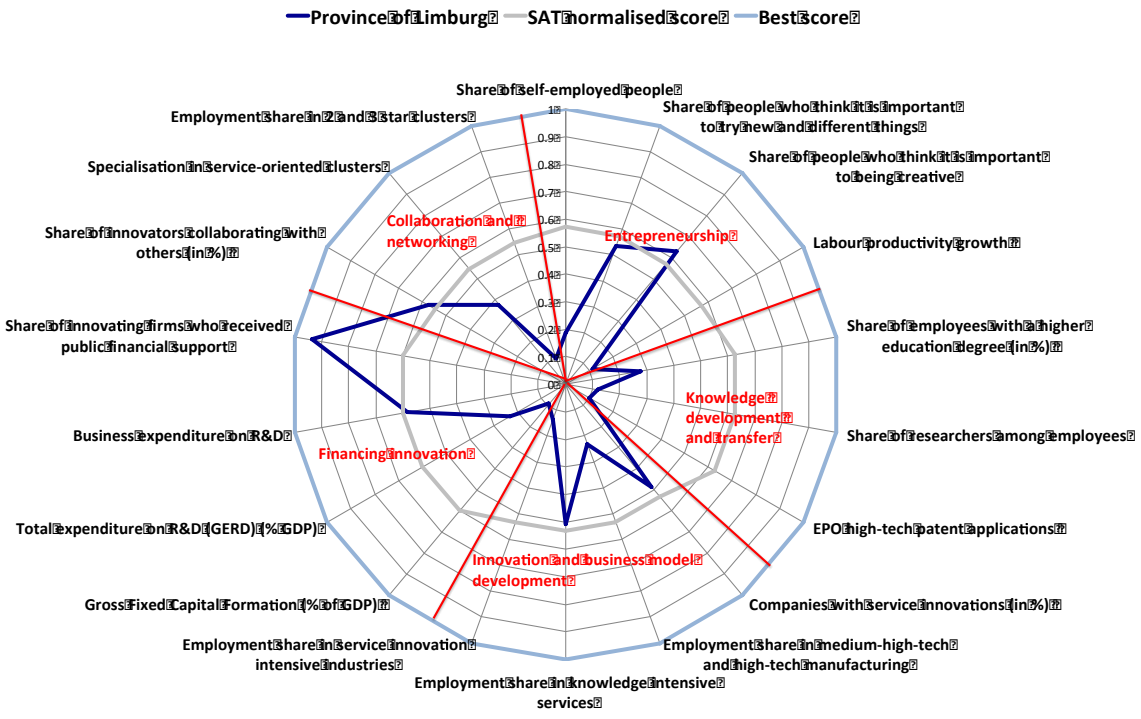
More information: http://vekoma.com/

2.4. Assessment of regional performance

Figure 2 shows the summarised results of the structural indicators on a spider diagram, where values of data from Limburg are contrasted against the best score of all EU regions in the same year. Although the best scores represent regions with different background and framework conditions, this diagram depicts the region's distance from an 'ideal' situation. In addition, the results of the ESIC Self-Assessment Tool (SAT), a small-scale survey of the views of key stakeholders in the Province of Limburg, have been also added to the graph, where the grey line represents the regional perception in terms of the five innovation system functions. Respondents were asked to assess, according to specific questions and on a scale from 1 to 5, if the regional innovation system and its elements were conducive to a transformative shift in the regional economy towards higher value added products and services.

As already outlined in Section 2.1, Limburg performs close to the EU average on indicators assessing entrepreneurship, innovation and business model generation and is better than the EU average in collaboration and networking. This is also reflected in the distance from the best scores and these are the dimensions, which are the closest, on average 60%, to the best performing region for this indicator. It is, however, performing worse in some of the indicators related to financing innovation and indicators related to knowledge development. The service innovation-related structural indicators also reflect that while there are companies with service innovation, this is not yet being exploited by existing manufacturing industries and therefore they are not using the transformative power of services.

Figure 2: Distance of the Province of Limburg from the best performing regions in terms of service-innovation related structural indicators



Notes: Data for the indicators are from 2010/2011, for exact year please see Table 1.

The SAT results are in line with the structural indicators in terms of entrepreneurial activities and innovation and business model generation rating them close to fair/to be improved. Scores are more positive about

creative industries, internationalisation and IPR, than the number of knowledge-intensive service providers and the involvement of services SMEs in large collaborative research and innovation.

Knowledge development and transfer is regarded to be in a fair state, according to the SAT although the structural indicators portray a less positive picture. The SAT scores are more positive for the educational and research landscape and for physical and virtual infrastructures, such as broadband, than for human resources and technology transfer offices and their relevance for service innovation. Knowledge development might become also an issue due to the ongoing demographic changes and shrinking population, especially in the area of Heerlen. As young and highly educated people tend to leave the region, it will become more difficult to maintain the necessary supply of human resources.

Financing innovation is another dimension where the SAT respondents are more positive than the structural indicators demonstrate. The SAT results are positive about the seed and venture capital available for service firms, but rated new forms of financial engineering mechanisms as an element to be improved.

The SAT indicates that collaboration and networking are close to fair, with additional steps needed to create a culture of collaboration between service firms and academia and to involve other types of firms, as well as users.

As indicated in the previous section, Limburg has several opportunities for exploiting the potential of service innovation but the structural indicators suggest that this is not yet happening to fullest extent. Even if the number of companies with service innovation is high, the region has a more moderate employment share in service innovation intensive industries than might be expected from its economic profile.

In sum, 'knowledge development and transfer' and 'financing innovation' are two dimensions that deserve more efforts to explore and better understand the underlying barriers. It should also be kept in mind that there is still a gap between the regional potential for service innovation and the level which is currently being attained by the local companies.

3. Regional Policy and Policy Mix

3.1. Innovation policy and institutional background

Innovation policy governance

The Provincial Government of Limburg is a key player in shaping the region's innovation system. It is its responsibility to develop strategies that give direction to developments in the field of economy, education, and geographical planning. The approach and focus the Province of Limburg adheres to when formulating strategies is presented in coalition agreements. In the agreements of the past governments, which are elected once every four years at the most, innovation has had a prominent role. Detailing of actual innovation policy measures is largely undertaken by the 'Cluster Economy and Innovation' unit of the Department of Economic Affairs of the Province of Limburg.

In the execution of (innovation) policy strategies, other regional authorities also have an important role. First of all, there is the LIOF, the Limburg Development and Investment Company, owned by the regional and national government. LIOF supports innovation, business development and entrepreneurship, as well as promoting industrial estates and attracting further investments. Its vision is formulated in a report which presents Limburg as the "*Heart of Western Europe*"[i]. Another local development agency is Limburg Economic Development (LED). As a partnership between the province, municipal governments, industry and education, LED invests in innovative initiatives in order to realise the goals for Southern Limburg that are set out in the Brainport2020-programme. Similarly, the development agency Parkstad Limburg (OPL) represents the interests of enterprises in 'Parkstad', the region of Heerlen, which is a collaborative arrangement between seven municipalities.

As in other Dutch regions, the Chambers of Commerce are also involved in executing economic policy. The three offices in Limburg provide advisory and administrative services to entrepreneurs. For SMEs with the ambition to become innovative, additional public support comes from Syntens Innovation Centre[2] and one of the branches of this national innovation network is based in Limburg. Together with the Chamber of Commerce, Syntens has been contributing to a number of LIOF programmes (see below in this section).

Strategic Programmes

The strategic focus of Limburg's policies for innovation is outlined in various policy documents (see Figure 3 below). The three main programmes contain a broad vision, including policy goals, and outline the contours of the policy interventions through which these targets are pursued. Figure 3 also shows some key policy documents that tend to be aligned with the strategic programmes.

The first notable strategy dates from 2005, when the provincial government was asked, by the national government, to formulate a strategy for the future of its economy. Limburg's answer was an Acceleration Agenda, in which the department of economic affairs and a few large municipalities, enterprises and social institutions laid out their ambitions for 2012[3]. The envisaged knowledge economy was to be attained by establishing triple helix collaborations that could reinforce the economic growth, employment and prosperity in the region. The three core elements of the Acceleration Agenda were: 'power clusters' in Healthcare, Chematerials and Energy and Agro and Food; vibrant and innovative SMEs; and a strongly developed infrastructure. The Acceleration Agenda, which was both an agenda as well as a legal entity, specified how these elements should be operationalised but did not provide the necessary funding for achieving this step. On the other hand, it did lay the foundations for subsequent programmes and agreements.

In 2008, the content of the original Acceleration Agenda was updated[ii]. Most importantly there is an increased focus on a selected number of knowledge and technology areas in which Limburg was expected to achieve a status of international excellence. Funding to execute the agenda was made available through an Investment Fund worth €137 million and an Innovation Fund of €20 million. Another change pertained to the governance of the Acceleration Agenda, as from 2008 onwards it was merged with the investment agency LIOF.

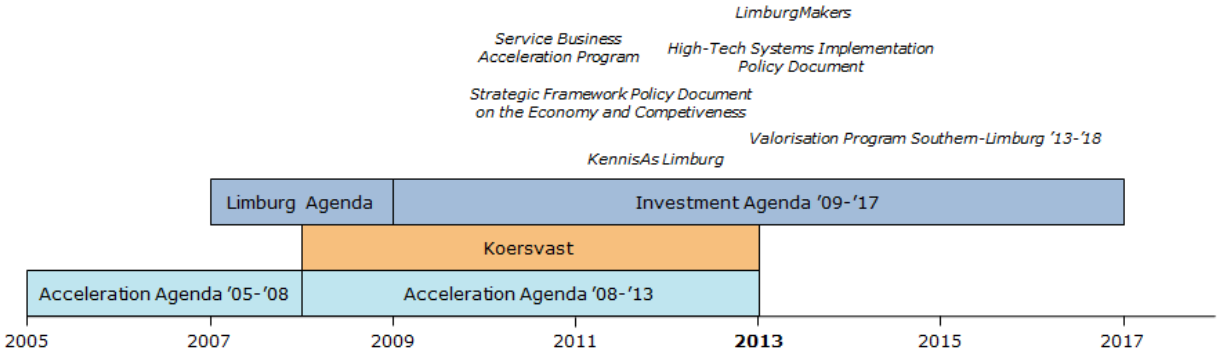
[3] The Chambers of Commerce and Syntens are soon to be merged into a single organisation.

Due to the onset of the financial crisis, the Province of Limburg decided to take additional action in 2008. A Taskforce of policy-makers, entrepreneurs and various professionals was created to develop a short-term strategy for limiting the negative consequences of the crisis.

Whereas the 2005/2008 Acceleration Agenda, outlined the directions which the region of Limburg would like to take, the 2007 Limburg Agenda specified how this could be done. In this document, the Province of Limburg presented a distribution of the tasks and responsibilities across municipalities and the Provincial Government. The five strategic pillars of the Limburg Agenda are innovation, mobility, international positioning, demographic change and integral regional development.

Subsequently, the proposals in the Limburg Agenda have been converted into concrete projects. The Investment Agenda for 2009-2017 contains a budget for 22 projects that corresponds with the strategic focus developed over recent years[iii]. However, the actual deployment of these projects is threatened by the budget cuts, which the national government has decided to implement.

Figure 3: Timeline of Strategic Programmes and key strategy documents in the Limburg province



The multi-regional Brainport 2020 strategy for the South-Eastern regions of the Netherlands is important for the strategic directions, which Limburg chooses. Strategic programmes have been presented at the sub-regional or sub-provincial level as well. The Valorisation Programme 2013-2018 for Southern-Limburg is being developed by a consortium comprising the University and the Hospital of Maastricht, Zuyd Hogeschool, LIOF and Chemelot Campus that jointly invest € 12.5 million[iv]. The Dutch Ministry of Economic Affairs recently granted this programme a subsidy of an additional € 4.5 million. In line with Brainport 2020 and Horizon 2020, these investments have to lead to a better 'infrastructure for valorisation'. The core idea is that (southern-) Limburg's knowledge production is strong, but application and cross-fertilization remain weak. The four main action lines of the programme concentrate on improvements in entrepreneurship education, more intensive knowledge circulation amongst enterprises and educational institutions, professionalisation of the valorisation process and a better exploitation of the Chemelot and Maastricht Health campuses. Again, the role of these campuses and their potential to incubate and accelerate is emphasised heavily. Limburg Economic Development (LED), a southern Limburg investment agency, also contributes to the Valorisation Programme. LED has its own agenda with a focus on Chematerials, LifeSciences, HighTechSystems, Logistics and New Energy. As such, the sectoral and thematic priorities overlap with those of the Valorisation Programme 2013-2018. LED emphasises the importance of bundling together the forces of a wide range of regional players in Limburg, in order to achieve the region's ambition of becoming a strong knowledge economy.

Overall, the development of strategic programmes shows a reasonable level of consistency. A focus on a limited number of sector-based clusters is present in each of the visions that have been formulated. The provision of support for collaboration within the region is also high on the policy agenda, for instance, in creating triple helix partnerships, deploying campus-linking infrastructures and initiating cross-sectoral activities. Additionally, collaboration beyond the region such as linking up with nearby regions and internationalisation has also been gaining increasing attention. Finally, human capital and other labour market issues, like the expected shortage of skilled personnel, feature prominently in the latest strategic programmes.

Ambitions in respect of the regional economy are captured in other documents apart from the strategic programmes. A notable example is the 'Strategic Framework Policy Document on the Economy and Competiveness' of March 2012. This document describes how the latest provincial coalition regards the established cluster approach as the way to increase regional competiveness. Thus, it is very much in accord with the agendas mentioned above.

To conclude, the educational institutions in the Limburg region have also been developing their plans in joint strategic programmes. First there was 'Accelerate and strengthen' in 2010, which was recently followed by 'KennisAs Limburg'. Consistent with the content of the Limburg Agenda, the institutions have set out their strategies for the next ten years. Based on the strengths of the universities, the focus is on the domains of Health, Business, Law & Culture, Materials and AgroFood & Health.

Attention to service innovation

As became evident in the last section, the focus of innovation policy in Limburg is mainly on clusters and campuses. Manufacturing, the chemical industry, health and agriculture are the domains that feature most prominently in the strategic programmes of the province. However, fragmented but increasing attention is being paid to services. Below, reports or initiatives that have a sectoral perspective on services are described and then those that have more cross-sectoral focus are explained. The main initiatives will be introduced here, sketching the context from which they originated, and further details about these initiatives are contained in section 3.2.

First of all, some clusters are centred on economic sectors with a high share of services activities. In the perspectives outlined in the original Acceleration Agenda (2005), services were hardly present. One exception is the field of logistics, in which the Limburg region has been positioning itself quite strongly. A suggested policy measure for this sector was a business matchmaking initiative in which an intermediary links Chinese suppliers of logistic services with local players who offer high-level services in areas like marketing, trade, packaging, export and law.

Apart from logistics, services appeared only in the context of supplying the industries that were the focal point of the Acceleration Agenda. For example, **Chemelot**, the campus for chemicals and materials, hosts an increased number of service providers. 'The Service Boulevard' supports industrial firms such as DSM, a global science-based company active in health, nutrition and materials, and SABIC, a manufacturing company, active in chemicals, polymers, fertilizers and metal. Likewise, specialised suppliers provide their services to the life-sciences and agro-food clusters.

With the updated Acceleration Agenda (2008), the picture changed. One of the identified 'growth potentials' concerned high-quality administrative services. The lack of employment in Limburg was a reason for policy-makers to look at the economic potential of the regional concentration of firms in the financial-administrative sector. The Province of Limburg asked the development agency from Parkstad (OPL) to make a business case for the further development of this cluster. The initial focus was on firms in the domains of pension provision and social security, given the local presence of several public and private organisations of national importance. The potential of the financial-administrative cluster was not fully exploited due to a lack of qualified employees. This was the rationale for a set of initiatives, including the creation of a consortium of interested stakeholders or **Smart Services Hub** and the establishment of an expertise centre, a transfer organisation, branding activities and development of new study curricula. So far, some of the goals have been realised and larger developments are on its way.

Meanwhile, another important development that took place was the establishment of a **Document Services Valley** (DSV) in Northern-Limburg in 2010. Policy-makers had been striving for several years to create such an incubator for document and information services start-ups. Finally it was Océ that made the move, with financial support of the Province of Limburg and Rabobank (see section 2.3). As an open innovation centre, DSV offers financial support and training to entrepreneurs.

Recently, DSV established a **Business Services School**, together with Maastricht University and Rotterdam School of Management. The educational programmes it provides aim at *"designing, developing and managing knowledge intensive business services"*. Its scope is broader than just information services. This also holds true for the **Service Science Factory** (SSF), which was initiated by the University of Maastricht in 2010. Instead of focusing on specific service sectors, SSF aims to stimulate service innovation in any sector. Firms wishing to develop a new service can hire a team of professionals and students to perform a project that is valuable and informative to all parties involved.

Some of the support for innovative (business) services stems from initiatives which are not predominantly oriented at service firms. Especially in recent times, policy-makers have become aware of the potential of services when it comes to transforming other sectors. In 2012, for instance, the governmental agency Innovation South NL published the 'Roadmap Services Business'. This guide is an outcome of the Service Business Acceleration Programme and was produced by BOM, EIZ, LIOF and Syntens. It helps firms from manufacturing sectors to reap the benefits of services. The guide provides a rich gamut of instruments, examples and tips.

'**LimburgMakers**' is another development that recognises how services can contribute to the success of economic activity in manufacturing sectors and this programme was launched in 2013. As an initiative of the Province of Limburg, LIOF and Syntens, it has a budget of €10 million for the next three years to help manufacturing firms with the development of both new products and services.

Largely in line with this last perspective is another approach embedded in **KennisAs Limburg Strategic Plan**. In addition to promoting a Smart Services Hub or Campus, the plan also regards services as a promising 'cross-cutting' field of research and innovation, much like themes such as the bio-based economy, sustainability and healthy living.

Of course, there are some recent programmes in which services play only a minor role. However, even the 'High-Tech Systems Implementation Policy' (March 2013), for example, is not as exclusive to high-tech as its name suggests[4]. The budget of €10 million, made available by the Province of Limburg through its Department of Economic Affairs, is available for firms in the manufacturing industry, as long as it has a good innovative plan. More importantly, the corresponding policy implementation document emphasises the ambition to connect existing campuses in order to create cross-overs.

In conclusion, two parallel developments can be observed. One of them is the increasing attention to service innovation in service sectors, such as financial-administrative and document-based services. The second development in the thinking about services in Limburg's innovation policy is the emerging understanding of services as being a source of competitive advantage for manufacturers and a fruitful source of cross-overs between campuses. This last perspective is the most recent and the less detailed.

3.2. The policy mix

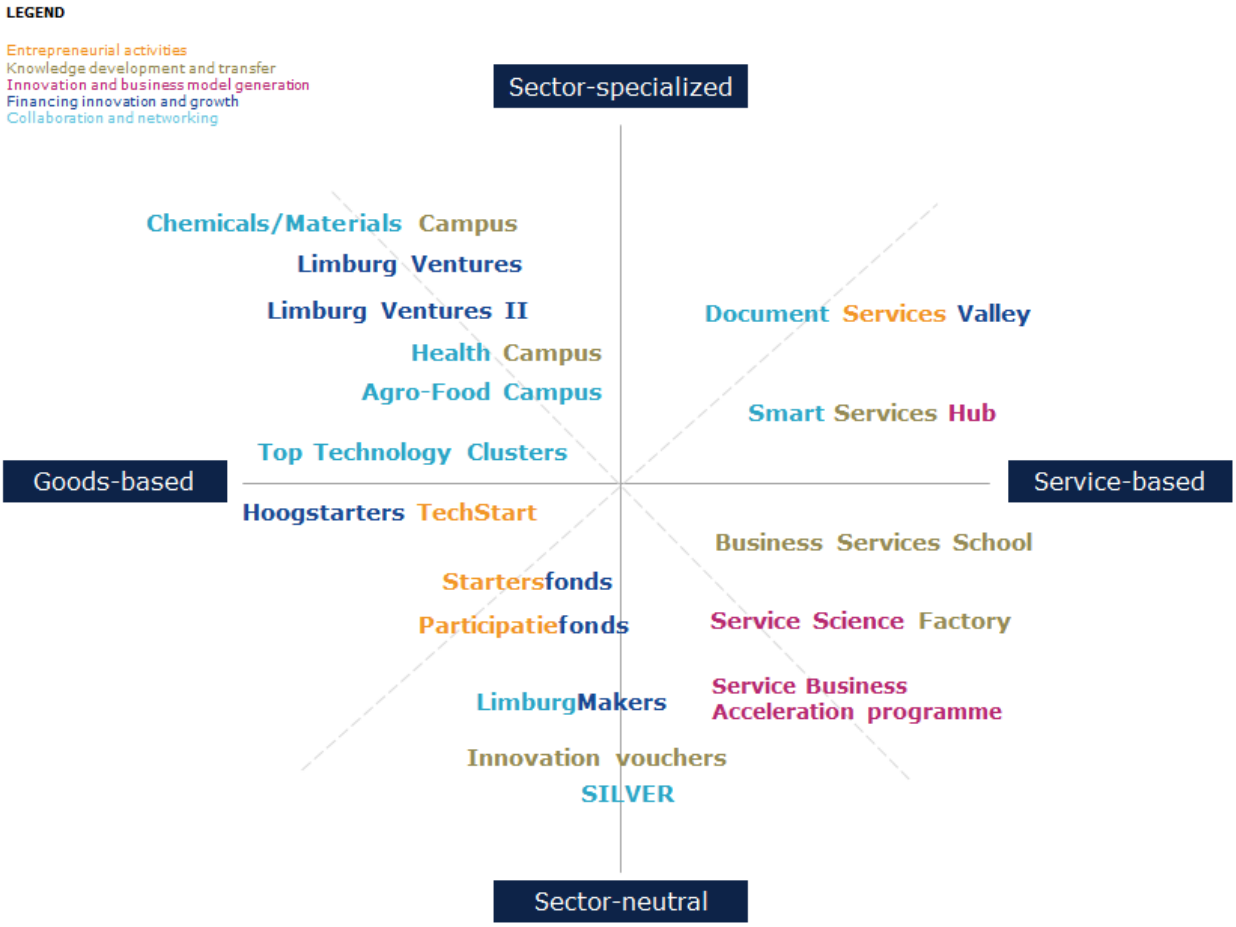
The regional policy mix for innovation

Figure 4 provides an analytical overview of the regional policy mix (see Appendix F for references to individual policy measures and further details). Current policy measures are plotted on a matrix in which the horizontal axes indicate the extent to which a certain measure is specific to goods or services. If a measure is not particularly dedicated to either of these domains, the vertical axis enables a distinction to be made between measures that are not specific for any sector at all or 'neutral' and measures that explicitly address goods or technology and services activities (or sectors) at the same time, which are 'specialised'. The colours refer to the functions of the innovation system to which a particular measure is relevant. Whenever a policy instrument affects multiple functions, it has multiple colours. The axes in Figure 4 correspond to a great extent with common classifications for the way service innovation is addressed by innovation policies[5].

[4] www.liof.nl

[5] The framework is mainly based on the classifications by Den Hertog et al., (2000), 'The Smart Guide to Service Innovation' (EC Enterprise & Industry, 2012), and 'Strategies, policies and rationale for service innovation'(Dialogic/OECD, 2012).

Figure 4: Categorisation of regional innovation policy instruments



Specialised goods-based policy instruments in Limburg involve many of the public-private partnerships that have already ben mentioned as having a sectoral focus. The chemicals-materials campus (Chemelot), the agro-food campus (GreenPort) and the health campus are oriented towards physical products, although their attention to services has increased over the past years. These campuses build on, or create, networks in which various partners can find each other and initiate collaborations or trade relations. Those campuses that are situated near Maastricht University also serve as channels for knowledge transfer.

Top Technology Clusters (TTC) cut across the borders of the Netherlands (Limburg), Belgium and Germany. They are co-funded by the European Commission. The contribution of Limburg is managed by LIOF. The TTC focal points cover a range of sectors, including health and life sciences, ICT, energy, chemicals and advanced materials. Cross-border innovation projects are supported through networking events, roadmaps, workshops, vouchers and advice from business developers.

In addition to the collaboration instruments, this category also includes Limburg Ventures, a venture capitalist fund, in which the province of Limburg invests via LIOF. It has a clear focus on investments and on firms that are located on the Chemelot Campus. It also considers funding requests from international firms that combine locations in Limburg with locations in neighbouring regions in Belgium and Germany.

The Province of Limburg and DSM, together with Particon and Rabobank, set up the venture capital fund called Limburg Ventures II. It is a revolving fund and it has an expected return of seven percent per year. The fund will focus on companies that develop goods and that provide services. The two sectors targeted by the fund are materials and life-sciences. Investments in the early stage and growth stage are targeted, with an investment of € 250.000 – € 8.000.000, and preferably invested in firms that are linked to the Chemelot

Campus. The first fund (Limburg Ventures I) was managed during the period 2004-2011 and initiated by DSM, LIOF and Moraco. Investments were up to € 1.5 million.

Neutral goods-based policy instruments, as opposed to the previous category, do not concern a particular sector. Most identified instruments provide financing for different stages of the innovation process and, especially, business growth. LIOF is managing, or contributing to, all the financial instruments:

- **Hoogstarters TechStart** is moderately neutral in terms of sectors and its priorities include chemicals, agro-food, health and life sciences. TechStart provides pre-seed funding for high-tech entrepreneurs such as (academic) researchers. Funding is combined with entrepreneurship support by means of advice and coaching on IPR and support in terms of business location and using research facilities;
- **The Startersfonds** provides pre-seed funding as well as financial support for the actual start-up of a company and even a second start if financial difficulties are experienced. Via this fund, the Province of Limburg provides loans to, and directly invests in, firms through a minority share. The Startersfonds has a small bias towards industrial goods, but recent documentation is clear about its ambition to address start-ups in the manufacturing and services sectors;
- **Nedermaas Ventures** is a similar policy instruments. Pre-seed and seed investments are provided to high-tech start-ups in areas such as agro-food, health and life-science;
- **The Participatiefonds** are intended to support firms during the growth phase. Loans and investments are more substantial, with loans being between € 150.000 and € 2 million. The province of Limburg, via LIOF; and DSM are the investors.
- **LimburgMakers** is a new support measure launched by LIOF, the Province of Limburg and Syntens, in September 2013, which addresses SMEs. Although it is primarily focused on industry, one of the four themes selected is service innovation. Workshops will be organised for SMEs in the manufacturing industry that are interested in improving their products through new service concepts. The programme aims to exchange innovation opportunities with manufacturing companies in the Limburg region. If any of the SMEs has a good plan, LIOF will support this innovative project with a subsidy, hence the follow-up of ideas is ensured. The LimburgMakers will be also connected to the innovation voucher scheme, as the SMEs can use such vouchers to buy the services of knowledge providers. LimburgMakers is also connected to the Service Science Factory although, as the initiative is just kicking off, it is too early to speak about any concrete joint actions.

Finally, the neutral regional policy instruments in Limburg contain two neutral instruments for knowledge transfer and collaboration. One of them is the **Innovation voucher scheme** which firms can use to gain access to the knowledge of other parties. The other policy measure is **SILVER** (Symbiose in Limburg Versnellen en Realiseren). This instrument was copied from a UK initiative to organise workshops and bring together actors from different sectors, to create new ideas and explore cross-overs between sectors. SILVER is supported by both regional and national policy-makers.

Specialised service-based policy instruments, in the case of Limburg, include public-private partnerships with a focus on a particular kind of intangibles:

- **The Documents Service Valley** (see BOX 1, p. 11), is an incubator for 'document services'. DSV supports firms with innovative plans for services that fit into the eco-system of Canon-Océ. Despite looking at document services in the broadest sense of the word, it does have a (service-) specific scope;
- Similarly, **the Smart Services Hub** concerns a consortium of parties, mainly based near the city of Heerlen, Southern-Limburg, that are willing to invest in measures for exploiting the local expertise in financial-administrative and information-based services. The drivers to do so include both the economic potential, through developing innovative solutions and smart services, and solving the lack of adequately skilled personnel, through developing new curricula. SSH is a triple helix effort, involving enterprises from the financial-administrative sector such as Rabobank, APG and Obvion, knowledge institutions including Maastricht University and the Open Universiteit, and regional public institutions such as the Province of Limburg, Statistics Netherlands, the Municipality of Heerlen and the Chamber of Commerce. Current efforts are focused on the creation of an Expertise and Innovation Centre for Smart Services and Business Intelligence. The ambition of SSH is to create and exploit expertise in the field of smart services by responding to societal challenges and the needs of a wide range of businesses. In time, this might even lead to the emergence of a Smart Services Campus. The educational institutions involved in KennisAs Limburg have already committed themselves to the further extension of the SSH.

In terms of the functions of the regional innovation system, these initiatives are most relevant for collaboration and networking. At the same time, they are focal points for preparing, managing and disseminating projects in which knowledge is developed and transferred, be it between universities and enterprises or between enterprises, themselves. They are also places where researchers meet with entrepreneurs and investors. Creating new business models is most prominent in the activities of the Smart Services Hub, by applying university knowledge amongst others, while the Document Services Valley is characterised by its ability to fund start-ups.

Figure 5: Services related campuses and clusters in the province of Limburg

Finally, **neutral service-based policy instruments** concern another two public-private partnerships and a programme for servitisation. These instruments address knowledge development and transfer, as well as innovation and business model generation.

The **Business Services School** is a recent activity of Document Services Valley, together with Maastricht University and Rotterdam School of Management. It offers courses on service innovation management and entrepreneurship. The educational programmes it provides are aimed at knowledge intensive business services, in general, rather than being confined to document services and directly related domains.

The **Service Science Factory (SSF)** is an initiative of Maastricht University and is based in the same city. The SSF can be described as an innovative place where students, researchers and professionals work in a pressure-cooker environment to invent new, or improve, existing services. It offers companies, governmental entities or different organisations the opportunity to present their problems to dedicated project teams and, after six to eight weeks, receive a working solution, which might be a complete service or its prototype. SSF is neutral as its staff and students support service innovation and service design in any sector or at the intersection of sectors.

The Service Business Acceleration Programme, briefly mentioned in section 3.1, is an initiative to help manufacturing firms become more service-oriented. This ambition is similar to one of the pillars of the LimburgMakers programme, but it should be noted that LimburgMakers also contains other activities for manufacturing, and not service-oriented, SMEs. In 2012, the Service Business Acceleration Programme published the roadmap Services Business, a collaborative effort from local manufacturing firms and innovation and development agencies in the three southern provinces of the Netherlands. This roadmap is a

product of the operational programme OP Zuid. Its main objective is to stimulate manufacturing firms to increase the number of services such as logistics, leasing, training, monitoring/diagnosis and maintenance that can be added to their equipment and systems. The roadmap ends with inspiring examples and lists the regional agencies that can assist with finding relevant expertise, as well as financial resources.

Innovation policy measures at other policy levels

Although the emphasis of this section is on the regional policy mix in Limburg, four points should be made regarding relevant policies at other policy levels.

Firstly, the Dutch provinces of Limburg and Northern-Brabant collaborate intensively in the context of Brainport. The wider Eindhoven area, located in Brabant, hosts an impressive ecosystem with high-tech manufacturing and services firms, the Eindhoven Technical University, research institutes, such as TNO and the Holst Centre, and strong links to firms and universities in Limburg, and to firms, research institutes, such as IMEC, and universities in South Brabant. The ambitions of Brainport are formulated in its Brainport 2020-Strategy, which is largely in line with the Horizon 2020 approach. Examples are the attention paid to Key Enabling Technologies as well as addressing economic and societal challenges.

Secondly, Limburg collaborates with the other two Southern provinces of the Netherlands, Zeeland and Brabant in developing regional economic strategies. One of the objectives of this collaboration is to develop plans for, and acquire funding from, the European Regional Development Fund (ERDF). The Operational Programme South (OP Zuid) has been receiving funding during the ERDF programming period 2007-2013. Currently, the Brainport 2020 Strategy serves as a basis for the formulation of the regional innovation smart specialisation strategy (RIS3) for acquiring ERDF funding from the next programming period of 2014-2020. Priorities are defined in terms of knowledge economy, innovation, entrepreneurship, competitive regions and the increased attractiveness of cities. Projects approved will cover a broad range of sectors, social and economic challenges.

Thirdly, the Dutch top sector approach or 'Topsectorenbeleid is very relevant to Limburg. Although the regional priorities are less explicit than in previous rounds of national innovation policies, such as the Pieken in de Delta Programme, there still are regional focal points. Examples are high-tech systems in the wider Eindhoven area of Brainport, the chemical industry in Limburg and logistics in Rotterdam and the Southern part of the Netherlands including Limburg. The attention to service innovation, that is substantial in Limburg, is less substantial in the national priority sector approach. To some extent, service innovation is addressed in the context of sectors such as logistics, creative industries and energy. ICT is regarded as a promising cross-sectoral domain and has its own 'top consortium for knowledge and innovation' or TKI.

Fourthly, through participation in the ERDF programme (OP Zuid) mentioned above and the smart specialisation strategy, Limburg is also involved in European policies.

BOX 3: SYSTEMIC DESIGN IN INNOVATIVE HEALTHCARE AND TECHNOLOGY

The region is in a good position to promote innovation in the cure & care domain of life sciences & health. Key assets are strong knowledge institutions in higher education including the University of Maastricht, Maastricht University Medical Centre and the Hogeschool Zuyd. In addition, there are strong SMEs in the domain of cure & care technology, plus innovative public and private institutions that provide domiciliary health care services.

The Centre of Expertise for Technology in Care is coordinated by the Hogeschool Zuyd. The centre has been developed as a regional innovation programme in which knowledge institutions, educational institutions, health care institutions, private companies, local authorities and client organisations share means, expertise and infrastructure. The idea is to create more capacity and focus and to share knowledge and joint responsibility in the education and training of technicians and health care professionals, at the different levels of Vocational Education, Bachelor, Master and PhD. There are seven main themes:

- Care at a distance/monitoring;
- Robotics;
- Technological appliances;
- Measurement instruments;

•Community centred care and welfare (extra-muralisation);

•Inter-professional collaboration;

•Lifestyle, exercise.

Because the main objective of the Centre for Technology in Care is to bridge between the fields of healthcare and technology development, the centre is well positioned to contribute to innovation in services and related goods, for example in aspects like medical equipment and remote health monitoring. Recent publications by the centre illustrate that user involvement is crucial to innovations in the field of healthcare. In addition, the objectives and strategy of the centre have explicit links to societal challenges such as active ageing. One of the implications is that the centre and its partners have opportunities to participate in Horizon 2020.

3.3. Assessment of the regional policy mix

Service inclusiveness of the regional innovation policy mix

According to the classifications offered by 'The Smart Guide to Service Innovation' (EC Enterprise & Industry, 2012), and 'Strategies, policies and rationale for service innovation' (Dialogic/OECD, 2012), five 'service innovation approaches' can be distinguished:

1. The technological approach concerns policies that focus entirely on technological R&D;
2. The assimilation approach is used when policies for (technological) R&D are made service-inclusive such as by broadening criteria;
3. The demarcation approach involves policies which are specifically developed for service innovation, taking into account service peculiarities that are often sector-specific;
4. The embedded approach refers to neutral policies in which no distinction between sectors is made; and
5. Policies belonging to the systemic approach are characterised by their goal to combine goods-based and service-based innovation, also often in the context of a particular sector.

Both the review of the regional innovation policy, by the ESIC study team, and the results of the SAT reflect the fact that the policy mix of Limburg has some elements of a systemic policy. Opportunities in service innovation are addressed in most of the functions of the innovation system, although to different extents. Besides concrete policy measures that aim to foster industrial structural change through service innovation, such as the Service Science Factory or the LimburgMakers, the existing horizontal policy measures are increasingly being broadened by integrating service innovation and manufacturing developments within an holistic vision.

There is also a trend in 'Chemicals' – an industrial field that is quite strong in Limburg. In that field there is an increasing awareness of the importance of maintenance services, for example, and the availability of big data is a new source of support for analytical and advisory services.

When looking in more detail at the overall policy mix picture and linking the service innovation policy approach to the five systemic functions, the following observations can be made:

- Campus or cluster-initiatives in Limburg, accounting for most of the publicly offered **collaborating and networking possibilities**, are either goods or service based, conforming to the technological and demarcation approaches, respectively. They **rarely focus explicitly on product-service combinations**. The Document Services Valley comes closest to a systemic measure in which technology and services are seen in relation to each other;
- **Entrepreneurial activities**, including business support and advisory services, **are supported through a predominantly technological approach**;
- **Financing increasingly follows an assimilation approach**: apart from some instruments that fit into the technology approach, most instruments are opening up to all sorts of firms. Service innovation projects and start-ups have become eligible for funding, although they do not receive any dedicated financial support;

- For **knowledge transfer and innovation/business model generation, both the assimilation and demarcation approach have been followed**. The initiatives are partially driven by universities that have strengths in specific service domains.

Self-assessment

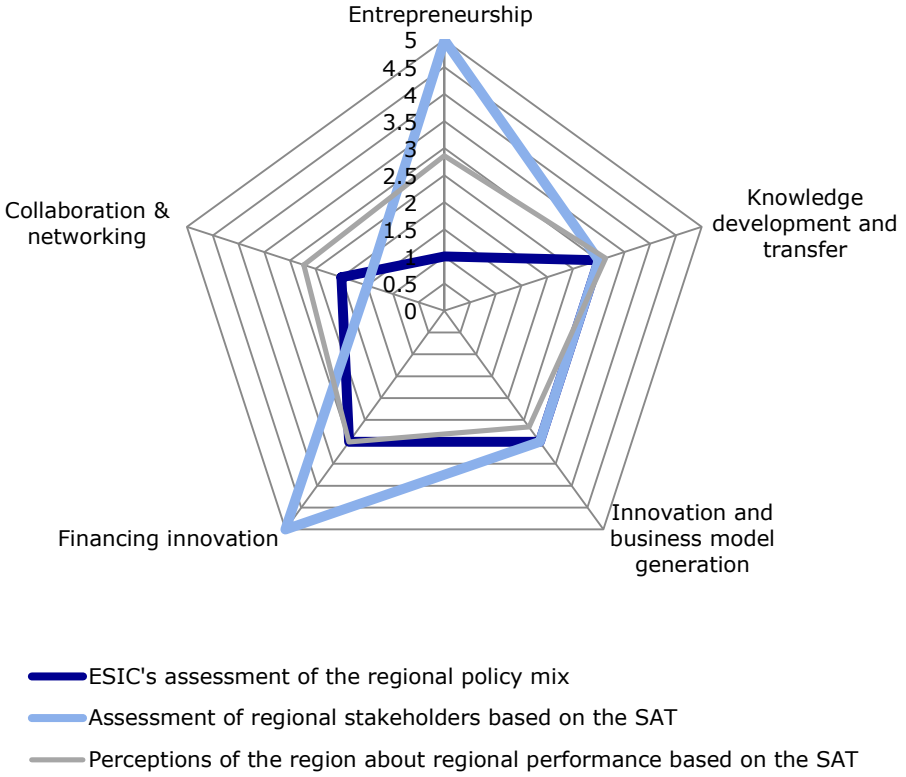
The ESIC review of the policy mix (see above) is not completely in line with the self-assessment by regional stakeholders which is represented by the light blue line in Figure 6.

Entrepreneurship activities and financing innovation were rated, by stakeholders, as following a systemic approach, meaning that service innovation is an integral part of the support measures. Nevertheless, stakeholders stressed that continuous attention is needed by regional venture funds, Limburg Ventures, which is specialised in the chemical sector, and LIOF. This is in line with the review by the ESIC study team, although the team noticed a bias towards high-tech entrepreneurs. The policies in support of **innovation and business model generation and knowledge development and transfer are seen to follow a demarcation approach**, meaning that services are supported in ways that are distinct from manufacturing-based approaches, mainly through vertical policy measures. This is also in line with the ESIC assessment above. Again, a number of relevant policies were also mentioned in the stakeholders' comments. One example is the increased emphasis of Maastricht University on knowledge transfer. Here, much is expected from the financial support provided by the investment agency LIOF and the financial, organisational, and networking support from the valley and campus initiatives in Limburg. It is surprising, however, that **collaboration and networking** schemes were assessed as being primarily focused on linkages between business, research and university and less on connecting manufacturing and service industry firms, as such. There are, however, some initiatives also focusing on services and service innovation in this regard. Potential improvements in collaboration and networking were also mentioned in the recent Berenschot (2013) study. Firms mentioned a large number of collaborative arrangements with other firms, clients, suppliers, universities, LIOF, policy-makers and consultants. At the same time, respondents mentioned that policy-makers should continue or intensify initiatives to link entrepreneurs with other firms, to assist firms in finding relevant partners and knowledge and to organise networking and matchmaking events.

The light blue line in Figure 6 shows the self-assessment of the regional policy mix following the results of the Self-Assessment Tool in terms of its service-inclusiveness, whilst the dark blue line reflects ESIC's assessment as presented above. It should be noted, however, that the values represent the type of policy approach chosen. Even if it is said that a broad-based systemic policy (5) is better than a policy that focuses only on research and technology and does not address service innovation (1), the policy mix cannot be judged only on these values.

Figure 6 provides another interesting topic for discussion, since it also illustrates the SAT responses assessing the strengths in the regional system functions, which are represented by the grey line. As already outlined in the assessment of the regional performance, the two areas that were identified as deserving more attention are financing innovation and knowledge development and transfer. When contrasting this picture of the regional performance with the regional policy mix, it can be observed that as long as financing innovation seems to be addressed by the regional policy mix, knowledge development and transfer will need more attention.

Figure 6 - Comparison of ESIC's assessment and the regional stakeholders' assessment of the service-inclusiveness of the regional policy mix



Notes: In terms of the values for the lines: 5 is the systemic policy approach that stresses the interrelations between technological and service innovation, and is focused. Often, this type of policy is dedicated to a specific sector or cluster, and acts on the multidimensional and systemic (open) nature of service innovation. 4 is the embedded approach that includes horizontal policies that cover a wide range of sectors and activities. In doing so, it does not discriminate between technological and service innovation. 3 is demarcation where there are separate initiatives launched to support services mainly through vertical policy initiatives. 2 is the assimilation approach where some of the existing policy measures have been adopted to allow for the participation of service industry firms but service innovation as such is not addressed. 1 represents a policy mix, where services or service innovation is not addressed at all.

The following gaps and problem zones can be identified as requiring further attention:

- **Knowledge development and transfer** is one area that should be better addressed in order to unlock the full potential of service innovation. In practice, this can mean continuing with the integration of service innovation related thinking into knowledge development programmes, such as university curricula and knowledge transfer schemes. It is important that future human resources are secured and have the requisite capabilities and also the motivation to stay in the region;
- **Entrepreneurship policies** should be revisited. Although the structural indicators and the self-assessment indicate that the situation in this respect is fair, the current policy is too technology-oriented and does not take sufficient account of the potential of service innovation. This is even more pertinent and desirable for SMEs, which are not yet engaged in the service innovation initiatives;
- **Collaboration and networking** should be strengthened so that there are not only service industry related initiatives but there is more interaction between the manufacturing and services more cooperation across the campuses.

4. Large-Scale Demonstrator: Observations and Reflections

The concept of a large-scale demonstrator refers to a systemic approach that aims to foster economic growth by addressing a specific problem or societal challenge through service innovation, under real life conditions. It also implies an integrated approach towards innovation in services and goods, including servitisation, technological and non-technological innovation and using small-scale pilots as steps towards large-scale pilots to test services, goods and integrated solutions. Moreover, the large-scale demonstrator approach requires the involvement of a variety of private and public actors, from different sectors and also users. Although large-scale demonstrators can be designed for specific and unique regions such as the demonstrator regions, the concept acknowledges the added value of involving partners and stakeholders from other relevant regions.

Actors in the province of Limburg are increasingly aware of the meaning that services could have for its economic structure. The concept note provided by the region contains a clear vision of the transformation it desires: the Province emphasises the wish to transform its manufacturing-based economy by adding value in the form of industrial services.

Policy interest in services has been growing, especially over recent years. However, a developed plan for effecting the envisaged transition in the form of an overarching strategy for service innovation is not yet available. Instead, service innovation is part of several distinct initiatives that are currently being implemented. By pursuing a knowledge-economy, the Province of Limburg is striving to develop an economy based on products and services with high added value. An assessment of the paths Limburg has chosen to explore is outlined below.

Campuses: exchanging lessons and exploring synergies

A key challenge for the Province of Limburg is to foster both specialisation in innovative themes through the campus initiatives and to exploit possible synergies between them. Combining expertise in one domain with excellence in another domain requires that actors involved in campus-initiatives, including the enterprises based at their sites, are open to participation in initiatives that go beyond their current activities. This is also true for exploiting services developed in one campus by the firms that are active in another campus. However, this is not necessarily a technological or sectoral denominator. In order to create mass and exposure, campus management organisations should work together on their branding and the sharing of facilities, management structures and capital funds.

The challenge for the campus policy is threefold:

- How can the campus initiatives best be connected and how can synergies be created, for example, through a joint public affairs approach, the exchange of management systems or co-investments in facilities?
- How can firms and other organisations located outside the campus be connected, within a specific cluster, to services, business and facilities on the campus? There are mutual gains if firms 'outside' can be connected to businesses 'on site', as suppliers, customers, R&D partners or service partners and if firms outside can use the facilities on the campus. This is also relevant for service innovation, as more can be done to connect outside or inside service providers to outside or inside manufacturing companies.
- How do we put the campuses in the spotlight internationally so that the campus can function as an attraction for foreign investments and international firms that want to move (partly) to Limburg?

Following the results of the regional study visit, the Table 2 lists a few promising domains, on which campuses and campus firms could work together and illustrates how the different campuses can contribute or benefit. Some of these crossovers have already been identified in the regional innovation strategy, such as the theme on the bio-based economy, which is also one of the areas mentioned in the 'KennisAs' plan.

Table 2 - Potential common denominators among campuses

Common themes	Chemelot Campus	Health Campus	DSV	Greenport	SSH	SSF
Bio-based economy	Bio-based materials	Health		Sustainability, environmental industry		
Big data and cloud computing	Remote monitoring of production lines	Data from sensors / trials. Confidential data from patients	Digitalising archives	Transparent food production chains	Financial-administrative data. Experience with storing / securing it.	Expertise to develop services based on analysis and visualisation
International transport and customs	Transport of chemicals	Micro transport, e.g. medicine, organs, blood	Digitalising customs	Excellence in logistics. Combo with sustainability (e.g. frozen cargo)	Expertise in handling administration	
Imaging	Expertise in visualising chemical structures	Use advanced imaging / scanning	Expertise in graphics and scanning			Design skills
3D-printing		Use printed implants	Technical knowledge of printers	Transform logistic sector		Develop platform to exchange designs
Active ageing	Pharma	Online health services	Online public and community services	Transparent food production chains, online retail		
Smart or green cities	Water, energy, waste	Local and online health services	Paperless city	Local production, processing and waste reduction		

Engaging in new initiatives might obscure the real focus of a campus. Thus what is needed is an appropriate governance structure, which allows a campus to maintain its identity and its preferred partners, regionally, nationally and internationally, but at the same time permits it to be involved in initiatives in which new crossovers are explored.

One services campus or better aligning on-going initiatives

In the plan 'KennisAs', Limburg presents smart services as being one of the important areas to be addressed by regional policy and points in the direction of positioning Limburg as an international hotspot for smart service innovation. This plan also outlines the potential establishment of a centre of excellence for scientific research and education in the field of Smart Services and Business Intelligence.

When considering a service campus, in whatever form, it is essential to develop a strong strategy with respect to questions like: Which knowledge should form the core of this cluster? What can be gained from bundling it together in one campus, rather than striving for relevant expertise to be present in other, existing campuses/clusters? Does the value of a smart services campus mainly lie in its contribution to a broad range of sectors, or in its functioning as a 'gravity centre' for financial-administrative knowledge?

Any consideration of these questions should take into account the fact that service innovation is a cross-sectoral phenomenon. Since services are commonly part of a value chain, 'isolating' the corresponding knowledge in a separate campus might not be an obvious solution. The concentration of firms around a specific domain creates a market for a variety of expert services that will still be connected to the industry. The case of the Document Services Valley illustrates how the presence of a strong manufacturer can lead to the emergence of many (high-tech) service providers that build on a similar type of knowledge. Due to its primary focus on a specific type of knowledge, related to documents, albeit in the widest sense, it appears to be effective in fostering innovative solutions and firms. The Smart Services Hub on the other hand, explicitly addresses the whole range with a (latent) wish to engage in service design. Its broad scope limits opportunities to develop a coherent ecosystem. A new 'community-based' initiative needs to make careful decisions in relation to its positioning. It faces the risk of losing focus and failing to be recognised, when it is neither a 'traditional' domain-specific cluster, nor a centre with a specific cross-sectoral scope. As a consequence, it is harder to establish the campus as the centre of a cluster that aims to attract foreign investment than to develop a clear strategy on how to position the campus and its facilities in a regional cluster.

Thinking of complementary policy interventions

In the Province of Limburg there are several on-going public initiatives in support of services industries and service innovation, such as the Document Services Valley, the Service Science Factory, the Smart Services Hub and part of the LimburgMakers programme. It is important that these initiatives link together and build upon each other. There are already on-going efforts in this respect, for instance, the Service Science Factory worked together with the Chemelot Campus to develop the community at the campus and similarly, the Service Science Factory hosted the first of three sessions of the 'LimburgMakers' programme. There are also some 'accompanying interventions' that form part of the previous Innovatie Zuid programme, which was an element of the Operationeel Programma Zuid' funded by the European Structural Funds. The idea behind the accompanying interventions was to link regional, national and international schemes more closely. Since there will be a new Operational Programme for 2014-2020, there might be some space to develop linking activities in the coming years.

There is less happening in terms of connecting services-related measures to horizontal measures. Firms wishing to develop new services are likely to find only modest support for entrepreneurship and collaboration and thus, these are two possible bottlenecks for a transformation towards a more service-minded knowledge economy. Some of the measures that follow a service-specific approach, such as Demarcation, tend to concentrate on a particular type of services, meaning that they do provide support that is designed for particularities of services, albeit not all of them. A danger here is that firms with an ambition to develop a certain service might perceive difficulties with finding support from the right instrument or initiative, or be ineligible to use any of the instruments at all.

As the previous section has already explained, some bias towards goods and technologies can be seen in the general innovation support instruments. For instance, both the Starterfonds and the Hoogstarters TechStart are mainly technology-oriented, even if there are trends towards changes in both programmes. The Startersfonds has a new ambition to address start-ups both in the manufacturing and services sectors. The subsequent reinforcement programme 'High-tech Manufacturing industry' is obviously focused on the manufacturing industries, although it mentions service concepts as an opportunity that could be better exploited.

If the service innovation measures do not want to remain isolated islands, they need to do more to integrate or link themselves into the mainstream regional innovation support programmes. This would represent a much bolder 'servitisation' strategy, which could include service innovation in all of the five innovation system dimensions than fostering 'pure' services related to health or business services in just in one of these dimensions.

Such an holistic strategy could also result in a bigger impact on the SMEs in the region that are not yet sufficiently involved, despite the fact that service innovation represents an important opportunity to increase their competitiveness.

Service innovation enabled by new technologies

Services are not only driven by service concepts but are very much enabled by new technologies which are even more relevant in specific industries such as health-care that uses new diagnostic tools, the chemical industry that introduces new environmental technologies based on which new services can be offered to chemical companies or document management services that rely on ICT. When designing the policies, this interconnection must be understood. It could be, for instance, one of the tasks of the Service Science Factory to provide more knowledge in this respect.

When designing the policies this interconnection must be understood. This also implies that a prerequisite for service innovation is a research infrastructure comprising test facilities, living labs and databases or that broadband should be developed in parallel to awareness raising activities about the potential of service innovation. Basic research and technology are drivers of service innovation and should not be forgotten, as the current policy mix seems to be more focused on applied research and, especially, experimental development, commercialisation and business creation. Technology radars, foresight studies and firms being inspired by leading regional, national and international researchers are all aspects that should be addressed along the path to service innovation. These technological assets could also form a basis for exchanging expertise and knowledge and organising collaboration among campuses.

One of the tasks of the Service Science Factory could be providing more knowledge in this respect. The Factory, with the participation of actors from Limburg, could also explore the options in Horizon 2020 for funding research and innovation that contribute to servitisation and ensure that relevant results from European programmes are shared with actors from Limburg.

More efforts to engage SMEs in service innovation

As explained in the assessment of the regional performance, service innovation in Limburg is mainly driven by some of the big companies, such as Océ-Canon and DSM, and by the public sector itself, whilst SMEs are less focused on service innovation. The first two, and even large incumbents want a valorisation of their expertise, possibly in the form of knowledge-intensive services, but are dependent on flexible and entrepreneurial organisations. Although this is understood by the regional policy-makers, more concrete initiatives could be launched to involve SMEs in service-innovation related initiatives such as awareness-raising campaigns or innovation prizes.

Consider the appropriate number of focal points

The profile of the region becomes less clear if there are too many focal points. On the one hand, the many service innovations and other developmental initiatives that are on-going should be welcomed and the variety within the province itself should be understood but, on the other hand, focusing on too many developmental priorities might weaken the competitive position of the region. Without a more coherent strategy and alignment among the campuses, the effectiveness of externally oriented communication, such as that to attract foreign firms or FDI, might be reduced. Moreover, it also has an impact on helping local actors to understand the strategy. This is why it could be wise to also reconsider the focus for a large-scale demonstrator strategy.

Addressing the European/international dimension

Many of the market and enabling factors that can help to unlock the potential in service innovation lie beyond the borders of the Province of Limburg. Policy-makers in the region recognise that cross-border cooperation between German, Belgian and other Dutch regional policies is of the utmost importance.

Better exploitation of the opportunities of an internationally open region needs further reflection on how, and in what form, related policies might be improved. For instance, new arrangements might be made in terms of insurance for expatriate employees, taxes for cross-border commuters or pension schemes. This might also be a potential area that could be better explored by the Smart Services Hub.

Although several projects have been already financed by the Interreg programme of the European Union to address service innovation across borders, the impacts of these projects are still weak in terms of improving or changing these important framework conditions. This point also highlights the need for more European level policy actions to complement these transnational initiatives.

5. Conclusions

Based on the above assessment of the regional performance and potential and the regional policy mix, and without repeating the detailed assessment of the regional policy and performance as outlined in the sections 2.3, 3.3 and chapter 4, this list contains the key points for discussion at the peer review workshop on the Limburg Large-Scale Demonstrator Strategy.

- Strengths and weaknesses in the regional system functions that require attention if the potential of service innovation is to be exploited: especially the dimensions of knowledge development and transfer, entrepreneurship policies and collaboration and networking;
- Systemic thinking in the policy mix especially on policies that support knowledge development and transfer, entrepreneurship and collaboration and networking;
- Building synergies between the campuses;
- One service campus or aligning existing initiatives;
- Engaging SMEs in service innovation;
- The framework conditions necessary to underpin cross-border developments.

Appendix A – Bibliography

Berenschot (2013). Eindrapportage Innovatieve Maakindustrie Limburg

Bruijn J.A. (2012). Diensten Waarderen. Adviesrat voor het Wetenschaps- en Technologiebeleid

Claassen R. Liem S. (2013). Innovative care and technology & introduction of social robot intervention in healthcare and education

Coalitieakkoord 2011-2015. (2012). Meer Limburg, minder overhead PVV-CDA-VVD

Coalitieakkoord 2007-2011. (2012). Investeren en verbinden. CDA-PvdA-PNL

Coalitieakkoord 2012-2015 Limburg, haal het beste uit jezelf! (June 2012)

InnovatieZuid (2013). Maakindustrie. Ontwikkelpaden voor servicebusiness. Survey

Kennis/As Limburg, (2013). Groeimotor van de region

Krebbekx J. Wolf W. (2013). Eindrapportage Innovatieve maakindustrie Limburg. LimburgMakers. LIOF. Province of Limburg

Kwakman F., Nieuwenhuis B. (2010). Reinventing Service Innovation "Discussienotitie over nieuw beleid voor diensteninnovatie in Nederland". Exser

Limburg Agenda (2007)

Limburgse Concurrentiekracht, strategische kadernotitie (maart 2012)

LIOF (2013). Limburg Province The Netherlands in the heart of Western Europe. Expand your business in Limburg.

LIOF (2013). Expand your Agro Food Business in Limburg, The Netherlands' most European region.

Programma versterking High Tech Maakindustrie.

Province of Limburg (2013). Versnellig en versterking. Position paper hoger onderwijs Limburg

Top economy, smart society

Uitwerkingsnotitie High tech maakindustrie

Versnellingsagenda 2005, Limburg op weg naar 2012 (oktober 2005)

Zuidelijke Rekenkamer (2011). Investeringagenda's provincie Limburg. Deel II Rapport van bevindingen

Appendix B - Stakeholders consulted

a) Jan Maatjens, Province of Limburg 14 July 2013

b) Henk Burks, Director, Document Services Valley, 17 September 2013

c) Bart Nieuwenhuis, Document Services Valley, 17 September 2013

d) Wouter Keij, Director, Greenport Venlo, 17 September 2013

e) John Slots, Smart Services Hub, 17 September 2013

f) Jan Kees Dunning, Director, Maastricht Health Campus, 17 September 2013

g) Jochen Bart, Managing Director, Maastricht University, Service Science Factory, 19 September 2013

h) Claudia Van Oppen, Maastricht University, 19 September 2013

i) Gaby Odekerken-Schroeder, Maastricht University, 19 September 2013,

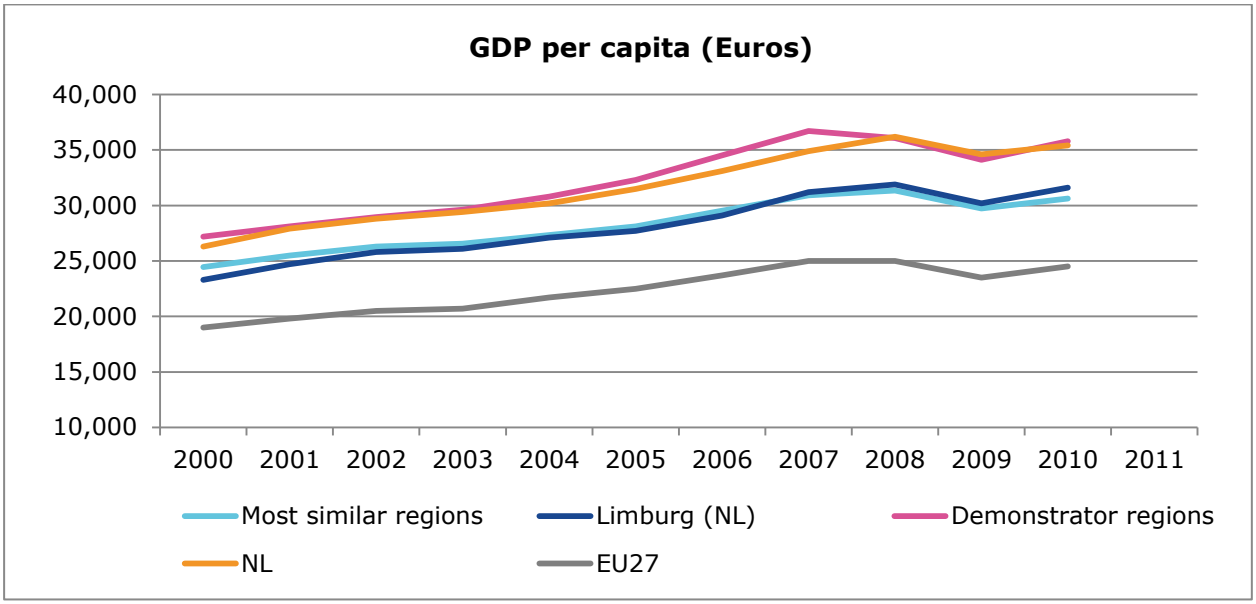
j) Charles Mevis, LIOF, 19 September 2013,

k) Ad van Ginneken, Syntens, 19 September 2013,

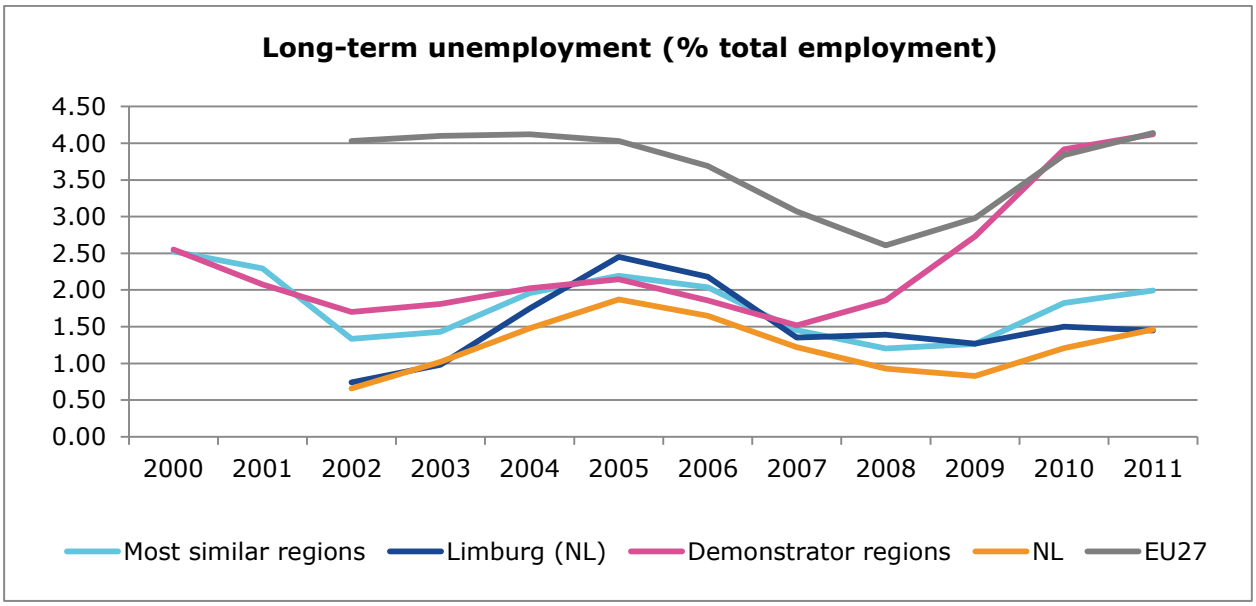
l) Frank Schaap, Chemelot Campus, 20 September 2013,

m) Peter van Heyst, Chamber of Commerce, 23 September 2013.

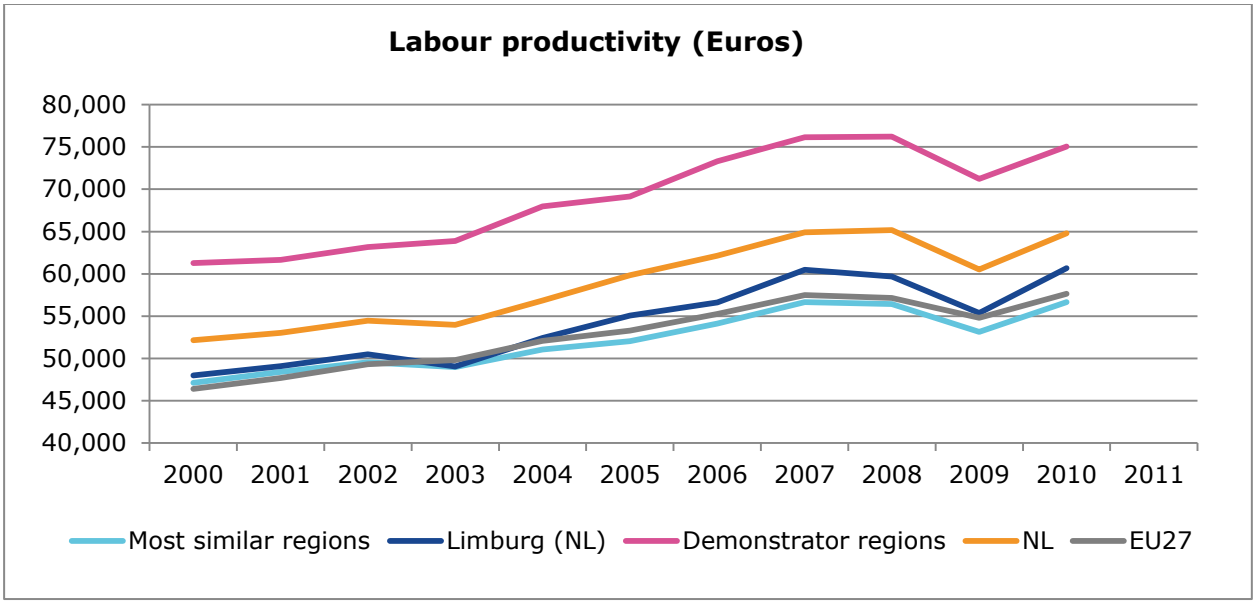
Appendix C - Regional benchmarking analysis



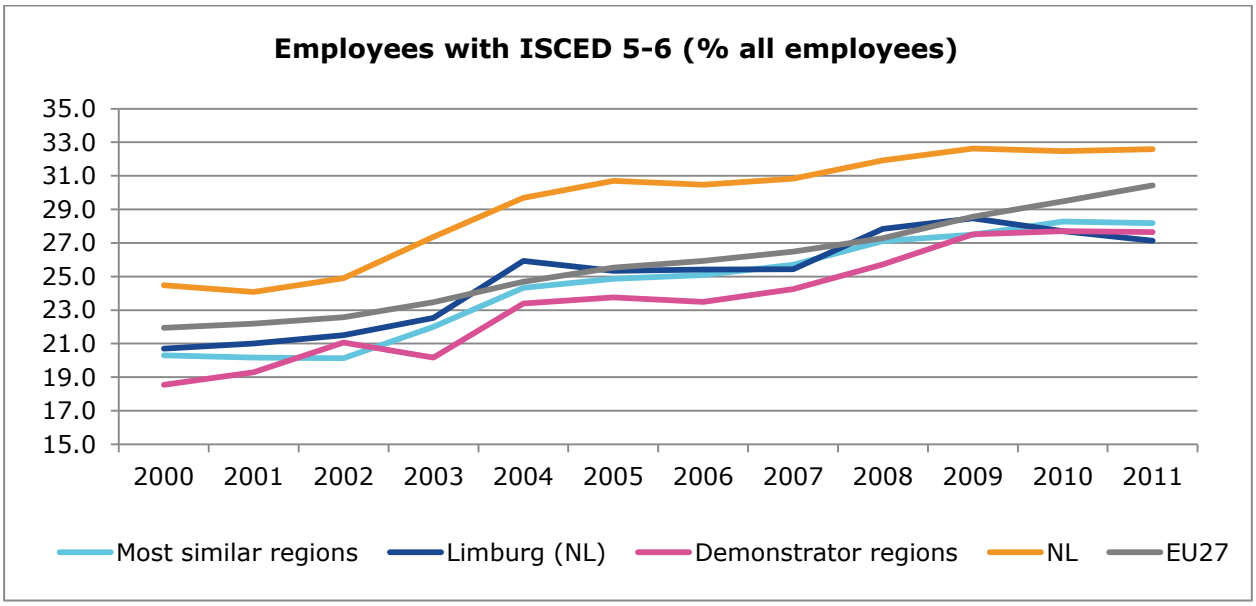
Limburg has seen a steady increase in per capita GDP over the time period 2000-2010 with only one small drop in 2009, because of the economic crisis. The level and changes over time of per capita GDP have followed an almost identical pattern as the most similar regions and has constantly been above EU27 levels. Demonstrator regions and national GDP levels have been above Limburg's but grew at a similar pace.



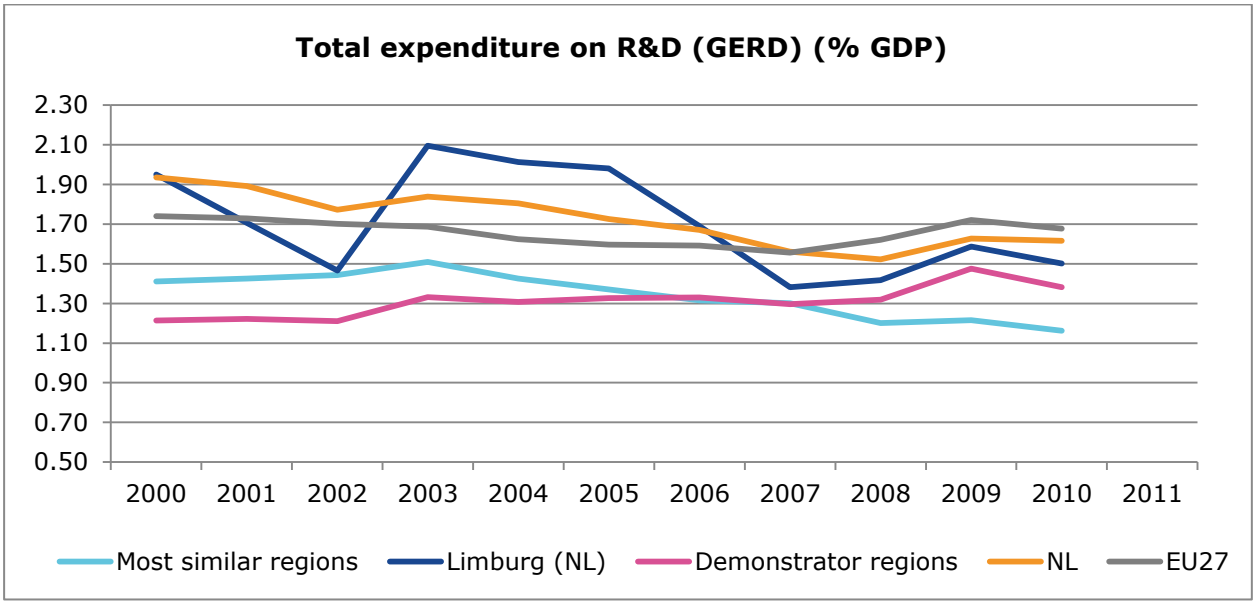
Long-term unemployment has increased over the period 2002-2005 from 0.75% in 2002 to 2.5% in 2005. From 2005 onwards, long-term unemployment decreased until 2009 from then it started to increase again due to the current economic crisis. Over the years, long-term unemployment has followed a similar pattern as the most similar regions and the Netherlands as a whole. It has also been constantly below EU27 levels.



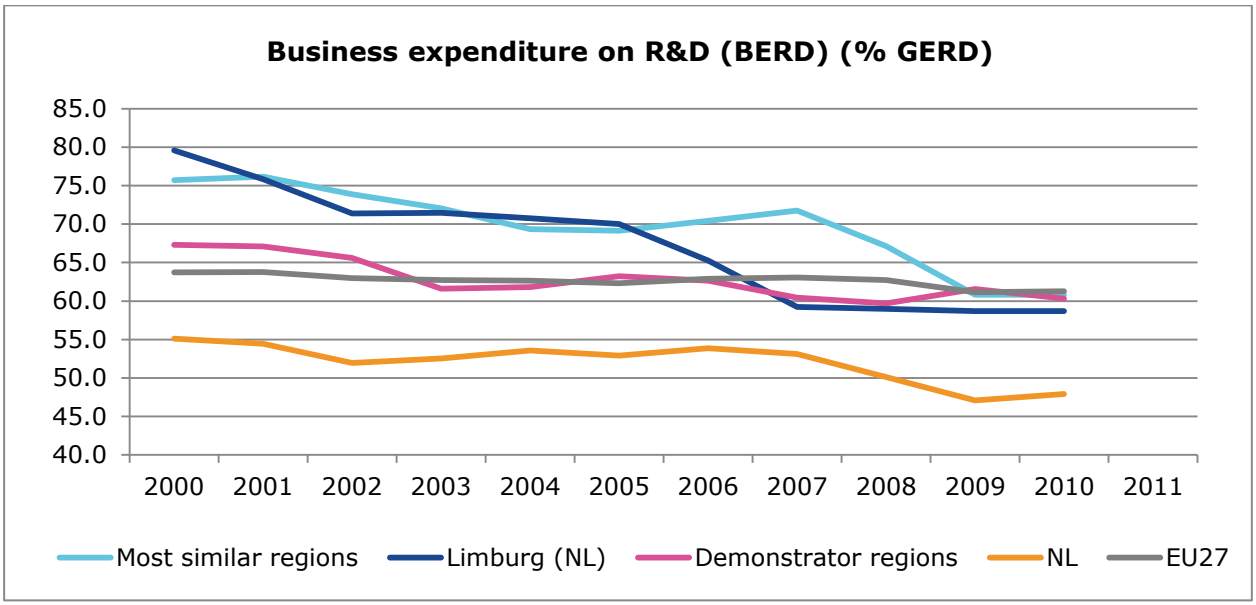
Labour productivity follows a somewhat similar development as per capita GDP: an increase until 2007, a decline between 2007 and 2009 and an upturn in 2010. The changes over time follow the same trends identified in other regions, but labour productivity in Limburg has constantly been below the level of the Netherlands and the demonstrator regions.



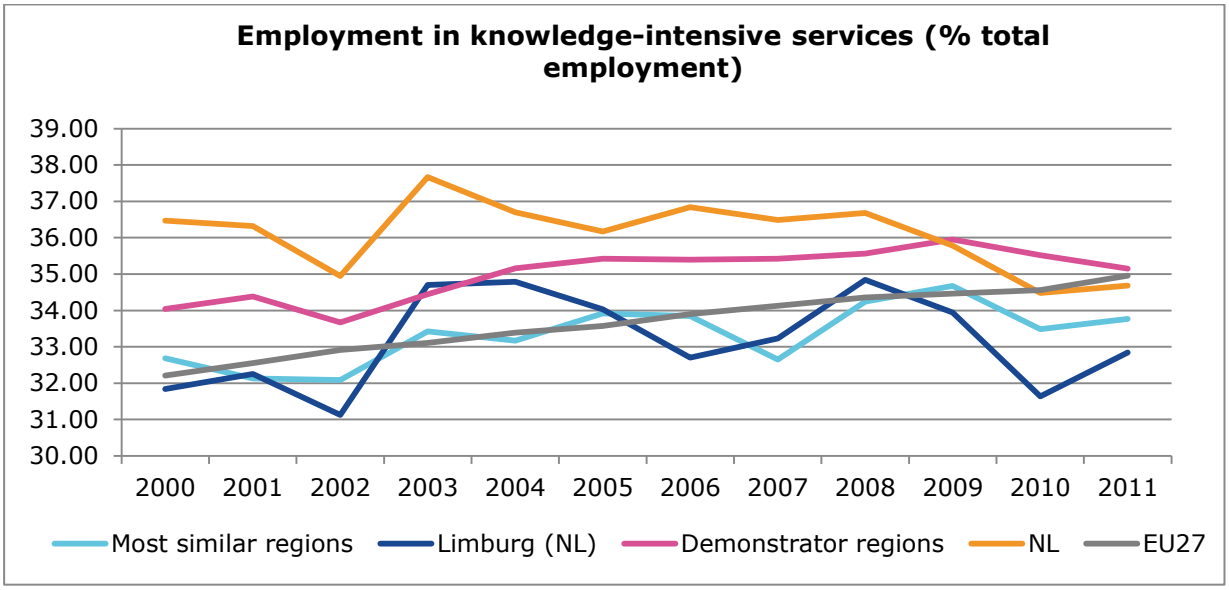
The share of employees with a completed tertiary education has been growing continuously for most of the period. It does seem that the general increase up until 2009 has come to a halt with a decrease in 2010 and in 2011. The share of employees with a completed tertiary education has continuously been below that of the national level but similar to other regions.



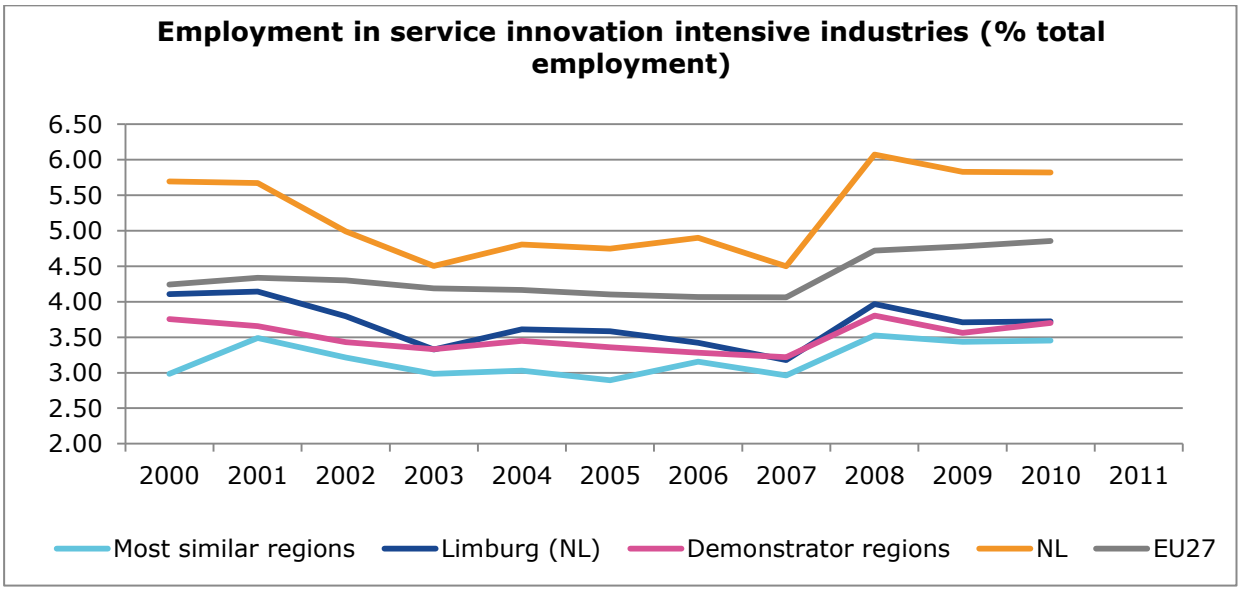
Total expenditures on Research and Development (R&D) have fluctuated in the time period considered at between 1.4% and 2.1%. Expenditures on R&D as %age of GDP have constantly been higher in Limburg compared to the most similar regions and the demonstrator regions.



The share of total R&D spent by the business sector has decreased from 79.6% in 2000 to 58.7% in 2010. This decreasing trend in the share of total R&D spent by the business sector is also seen in the other regions depicted. The business sector in Limburg has constantly spent a higher percentage of R&D, compared to the Netherlands as a whole.



Employment in knowledge-intensive services has fluctuated between 2000 and 2011 at between 31% and 35%. The trend for Limburg follows a similar pattern as the one for the Netherlands. In more recent years the share has been below that of all other regions.



Employment in service innovation intensive industries has been below EU27 and national levels and remained more or less stable over the years, with an increasing trend from 2007 onwards. A strong upturn in employment in service innovation intensive industries since 2007 can also be observed for the Netherlands and other regions.

Note:

Demonstrator regions: AT31 Oberösterreich (Upper Austria), ES7 Canarias (Canary Islands), ITD5 Emilia-Romagna, LU Luxembourg, NL42 Limburg, UKN Northern Ireland

Most similar regions: BE33 Prov. Liège, DE41 Brandenburg – Nordost, DK02 Sjælland, NL12 Friesland, NL13 Drenthe, UKC1 Tees Valley and Durham, UKC2 Northumberland and Tyne and Wear, UKL1 West Wales and The Valleys, UKL2 East Wales.

Appendix D - Institutional fabric relevant for service innovation

Name of organisation	Type of organisation	Principal activity related to SI	Annual budget (in euro)	Number of employees (FTE) and of which SI specialists	
Province of Limburg	*Regional government*	Policy-maker		na	na
Service Science Factory	*Non for profit organisation*	Research, education, business	€875k	10	7
(Document) Service Valley	*Non for profit organisation*	Research, education, business (start-up's)	€ 1400k	Approx. 6	4
LIOF	*Regional development company*	Business	N/A	N/A	N/A
Chamber of Commerce	*SME advise*	Business	N/A	N/A	N/A

Appendix E - Policy measures for service innovation

Title (in English)	Start year	End year	Public funding (latest figure available)	Private co-financing	Short description/ Relevance for service innovation
(Document) services Incubator (DSV)	2013		€ 1.2 m	€ 1.4 m	Campus initiative
Programme reinforcement High tech Manufacturing industry	2013		8.9 m	€ 10.4 m	Service innovation is included
Smart Services Hub (SSH)	2012		€ 750.000.	€550.000.	Triple Helix initiative (16 parties) merely grounded in the Financial-Administrative-Informative cluster with the aim to develop smart services.
Kennis/as Limburg	2013	2023	€180 m	€ 162 m	Ambitious ten year strategic programme of Maastricht University, Maastricht University Medical Centre, Zuyd University of applied sciences to strengthen economic and social structures in Limburg by a range of initiatives in the field of education, research, business, campus etc.

[i] LIOF (2013) – Limburg Province, The Netherlands in the heart of Western Europe. Retrieved from: http://www.liof.com/data/files/alg/id259/General%20Profile%20of%20Limburg%20in%20English%202013.pdf

[ii] http://portal.prvlimburg.nl/psonline/documenten/94629/8.11_B.1_jaarverslag_versnellingsagenda.pdf

[iii] http://www.zuidlimburg.nl/upload/div/investeringsagenda_limburg_2009_-_2017.pdf

[iv] http://www.maastrichtuniversity.nl/web/file?uuid=740c6c15-5134-426e-8b9e-f239b1505d96&owner=ea3535e8-668b-4b59-a539-12b793210905

This work is a part of a service contract for the Enterprise and Industry Directorate-General of the European Commission.