ROMANIA WEST REGION COMPETITIVENESS ENHANCEMENT AND SMART SPECIALIZATION

Smart Specialization Case Studies Report

Intermediate Report

June 2013

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Executive Summary

The West Region is the wealthiest in Romania apart from the Bucharest-Ilfov area in terms of per capita GDP, although there is considerable catch up still to be done before reaching EU averages in this regard. In order to shift its focus to higher value added activities and to accelerate the convergence process, the region needs to identify strategies to achieve sustainable and inclusive growth. In this context, the design of research and innovation policies for smart specialization strategies (RIS3) will play a key role in promoting a larger contribution of the knowledge factor to economic development.

Based on the idea that the effectiveness of targeted innovation and research policies depends heavily on the information available in the market on whether the economy has any sectors with observable comparative advantages, the current report follows a sector level approach in order to assess the economic specialization of the West Region of Romania and to identify smart specialization niches within target sectors (*automotive, textiles, agro-food, ICT, construction*, and *tourism*). It is worth noting that these sectors were selected for in-depth analysis, not because they are seen as "winning" activities per se, but because of their representativeness and potential in the West Region's economy.

To the extent that distinct degrees of information about economic specialization imply different chances of success with policy targeting, the sectors under analysis were classified in terms of the level of comparative advantage and areas for policy action were identified in order to guide programs and intervention that can help to enhance the growth potential of the region. According to information available in the market, the region has apparent comparative advantage in focusing on automotive, textiles and ICT, while agro-food and tourism were classified as sectors with latent comparative advantage, and the construction sector was classified as a sector with unclear comparative advantage.

As smart specialization policies ought to focus on increasing the knowledge content and value added of existing production in industries where comparative advantages already exist, and on facilitating the development of new economic activities through measures which support entrepreneurship and experimentation, the current report proposes areas for policy action both on a horizontal, economy-wide level, as well as on a targeted, sector-specific level.

Horizontal policy areas include the expansion and improvement of the vocational training system in order to address significant shortages of middle skills technicians which affect the majority of sectors, provision of entrepreneurial and business management training courses, improvements in the local road and transport infrastructure, and the expansion of access to finance. In addition, authorities could implement targeted measures to support the impact of research and innovation on growth. Improving the services provided by business incubators by introducing institutionalized mentorship schemes and sponsored networking or training programs may be considered among such activities. Establishing a seed fund to invest in regional innovative activity and designing innovation offices to match relevant university research with the needs of the private sector can also be instrumental in and increasing the competitiveness of local firms.

In the *automotive* sector, specific policy areas for consideration are the establishment of research institutes and testing laboratories, and promotion of the auto cluster's initiatives. For the *textile* industry policies could include the provision of tax incentives, subsidies, and better financing terms on productive investments in new technology and machinery. The *agro food* sector could benefit from the development of sector-specific support infrastructure and incentives for basic and applied research. *ICT* interventions could encompass the expansion of services provided by incubators and business accelerators, well-structured mentorship programs, and improved connections between angel investors and startups, as well as stronger links between global customers and downstream user sectors. In the *construction sector* policy makers should consider increasing awareness regarding the

activities of the regional construction and energy cluster (ROSENC) and expanding the award criteria for government infrastructure tenders to include the use of energy-efficient materials would help the sector. Lastly, in order to capitalize on the *touristic* potential of the West Region, the authorities could begin by setting the framework for a tourism cluster and supporting linkages to ITC clusters. In addition, the tourism cluster could be used to implement policy tools to guide European funds towards sustainable tourism projects with major positive externalities.

The current study focuses on broad areas for policy intervention that aim to enhance the growth potential of the region. **The Final Report prepared as part of this project synthesizes the results of the overall regional competitiveness assessment. In addition, it takes a more practical approach and, following the thematic objectives established by the European Commission for the 2014-2020 programming period, proposes specific investment priorities that best fit the specific development needs of the West Region.**

1. Introduction

The previous five reports under this assignment have provided a complete mapping of the key competitiveness factors in the West Region of Romania. Drawing on complementary methodological approaches the reports were intended to: i) assess the recent trade performance of the West Region; ii) evaluate the overall competitiveness of West Romania firms; iii) assess the linkages between economic activity, trade and location in order to identify the challenges of further developing and industrializing the region iv) carry out a qualitative analysis of factors that shape the economic development of the region; v) assess the logistics and transport infrastructure of the country and the region in particular.

The current report evaluates the economic specialization of the West Region of Romania, following a sector approach in order to enable a richer understanding of sector-specific contexts. following consultations with the Agency for Regional Development for the West Region of Romania, six sector-clusters[1] were selected for in-depth analysis, not because they are seen as "winning" activities per se, but because of their relevance and potential in the West Region's economy. These are:

- **Automotive**
- **Textiles**
- **Agri-food**
- **ICT**
- **Construction**
- **Tourism**

The current report has three main complementary objectives. Specifically, it seeks to:

1. provide a critical overview of the strengths and weaknesses of the sector's productive system, detailing demand and supply characteristics;
2. investigate the capacity of firms to adopt new technologies, taking into account the available skills composition, sector-specific regulatory restrictions, access to finance, etc. and considering the specific determinants of technological upgrading in the sector;
3. identify smart specialization niches within the target sectors, as well as the opportunities arising at the level of business and research and technological development infrastructure (RTDI) co-operation, as a way to detect the growth opportunities that lie ahead in these industries prior to the 2014-2020 programming period.

This report is structured as follows: Section 2 presents a brief overview of the *smart specialization* concept and introduces the analytical framework that will be applied to evaluate the economic specialization of the West Region of Romania; Section 3 presents an assessment of the local research and technological development infrastructure (RTDI) services, and discusses how the West Region RTDI ecosystem can be utilized and improved in order to sustain economic growth and unleash the regional potential in research, technological development, innovation, and entrepreneurship; Section 4 provides a detailed analysis at the sector-level which identifies the comparative advantages and the main bottlenecks to growth in the six target industries; Section 5 outlines areas for policy action.

1 In this assessment, the term "sector" refers to specific industrial clusters (based on NACE 2 classification) as defined in Annex 1.

2. Analytical Framework

The Europe 2020 strategy has set out three main reinforcing growth strategies to confront the structural weaknesses of the continent under a crisis scenario: i) smart growth, based on knowledge and innovation; ii) sustainable growth, promoting a more resource efficient, greener and competitive economy; and iii) inclusive growth, fostering a high employment economy delivering economic, social and territorial cohesion. Investment in research, innovation, and entrepreneurship represents the core of this approach. In 2011 the European Commission (EC) launched the 'Innovation Union'[2] flagship initiative, which introduces the concept of a 'smart specialization strategy' that aims to increase the impact of the research and innovation policies of Member States on economic growth. This framework is based on the concepts developed by Foray and van Ark (2007) and David[3], Foray and Hall (2009), and should be understood as a knowledge-driven approach to growth that will build on existing comparative advantages, will help develop new activities in places where a strong comparative advantage might arise, and will promote a larger contribution of the knowledge factor to economic growth. Thus, the role of a 'smart specialization strategy' is to act as a flexible system that endorses iterative learning by emphasizing the role of monitoring and evaluation mechanisms in the development of the strategy but does not target certain economic activities. This allows for policy experimentation which is crucial for structured learning and a systematic adjustment of programs and policies towards the pre-defined objectives.

Following this approach, Member States have been encouraged to define research and innovation policies for their smart specialization strategies and, more formally, the Commission has made the submission of a RIS3 an ex ante conditionality for access of Structural Funds in the 2014-2020 period.[4]

Against this backdrop, the current report follows a sector level approach in order to assess the economic specialization of the West Region of Romania and to identify smart specialization niches within the target sectors. The methodology used for this sectorial analysis draws on a recent study by Correa and Guceri (2013) which provides a framework to investigate the economic specialization of a region (or country) and then to identify targeted innovation and research policies that can nurture the growth potential of the economy.

Based on the idea that information is asymmetric and incomplete, the authors argue that a public sector governance structure that discourages efficient risk management and the collective decision making processes that are inevitably biased towards incumbents' interests may hinder the government's capacity to properly select sectors or products that may induce an economic transformation. As a result, **the effectiveness of targeted innovation and research policies depends heavily on the information available in the market on whether the region (country) of interest has any sectors with observable comparative advantages.**

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[2] http://ec.europa.eu/research/innovation-union/index_en.cfm

3 Foray, D. Van Ark, B. (2007): Smart specialisation in a truly integrated research area is the key to attracting more R&D to Europe. Knowledge Economists Policy Brief n° 1 October 2007

[4] See Commission's Cohesion Policy proposal – COM (2011)615 for 2014-2020 . More recently, as an effort to inform this process the EC has issued the Research and Innovation Strategies for Smart Specialization (RIS3) Guide which outlines six steps to establish a national or regional strategy, starting with an analysis of the economic specialization of the country or the region; continuing with the establishment of priority areas and of the consultative process through which these priorities should be determined; concluding with the set of monitoring and evaluation mechanisms necessary for implementation.

Building on this concept, Correa and Guceri propose three cases in which different degrees of information about economic specialization imply different chances of success with sector targeting:

- **Regions with apparent comparative advantage**
- **Regions with latent comparative advantage**
- **Regions with unknown comparative advantage**

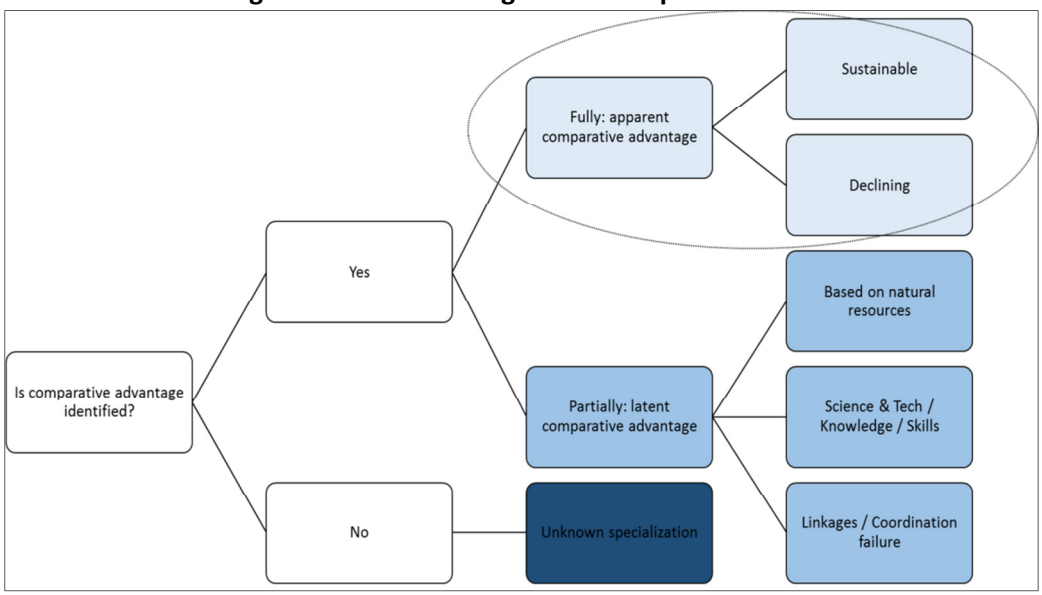
Regions with apparent comparative advantage. These are regions where a number of industries are already well-developed and have attained a level of competitiveness that allows the local firms in these sectors to export on the global market. In such cases, the key indicators and consultations with stakeholders should agree on the region's comparative advantage. However, regions of this type might be experiencing either growth or decline, therefore the pattern of specialization adopted so far may or may not be sustainable in the long term. In this case, targeted R&D and innovation policies might be useful to "complement existing productive assets", helping firms to maintain a competitive edge in the sector by investing in R&D or to regain competitive advantage lost to new players in the global market.

Regions with latent comparative advantage. These are regions where there is no significant industrial activity in the economic sector where the specialization potential is envisioned. However, the region may have the required knowledge due to (i) availability of a non-tradable, location-specific input, such as a natural resource, or an immovable asset (land and climate, for example); or (ii) local common knowledge about the economic activity, a tradition prevalent in the region that indicate potential for specialization. In this context, R&D and innovation policies (and also investments in skills-formation and other business development services) may be useful to 'unleash' existing comparative advantages.

Regions with unclear specializations. When the available information does not indicate any observable asset in a particular area of specialization sector targeting becomes less recommendable. In this context, policy-makers should focus on creating an enabling environment for efficient market selection allowing such specialization to emerge as a result of entry, exit and experimentation. This implies combining measures that promote firm entry and encourage startups (potential high growth firms) – and allowing firm exit. In this case, research and innovation policies play a central role in promoting entry but other policies are also relevant such as facilitating access to credit, skills and information; and improving the business environment (such as adopting pro-competition regulation in the service sectors).

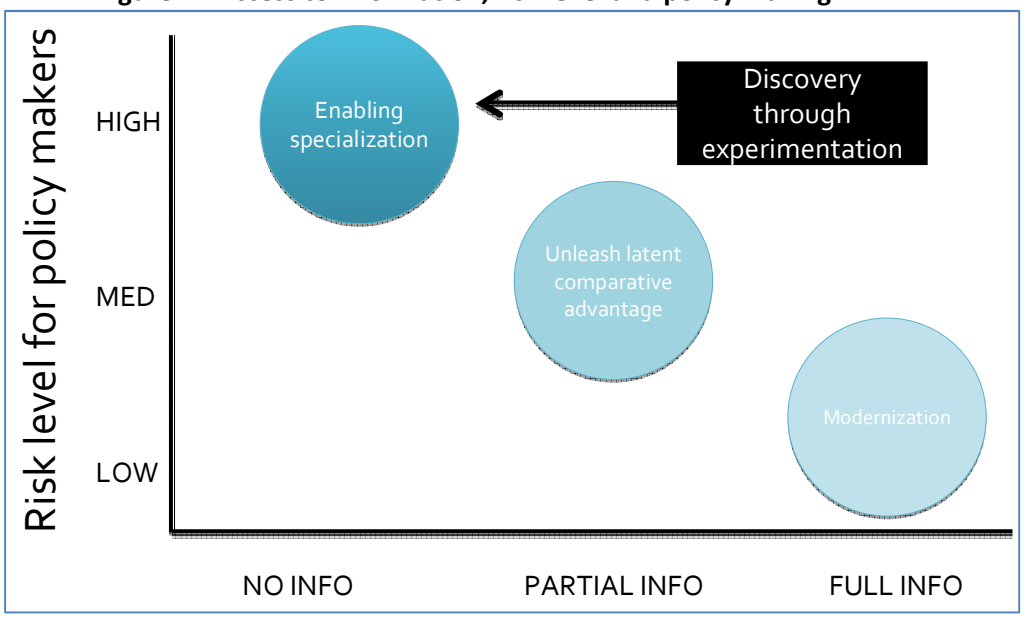
This approach is summarized in Figure 1 and Figure 2 below; the first one presents the guidelines for analyzing economic specialization while Figure 2 summarizes the argument that different degrees of information about economic specialization imply different chances of success with policy/sector targeting.

Figure 1-Understanding Economic Specialization



Source: Correa and Guceri (2013)

Figure 2 - Access to information, risk level and policy making



Source: Correa and Guceri (2013)

Therefore, in order to design a successful RIS3, it is critical to understand whether knowledge is a binding constraint against structural transformation of the region, as this also determines the nature of policy recommendations. If binding constraints relate to more structural bottlenecks on business environment, the region need to prioritize addressing these obstacles, while taking into consideration the next steps in research and innovation in its medium or long term agenda. On the other hand, targeted research and innovation policies can help sound companies in regions with *apparent* comparative advantage to keep a competitive edge in international markets or to cope with growing international competition, or support potentially high growth companies to unleash *latent* comparative

advantage through, for example, R&D and innovation policies, investments in skills formation, or other business development services.

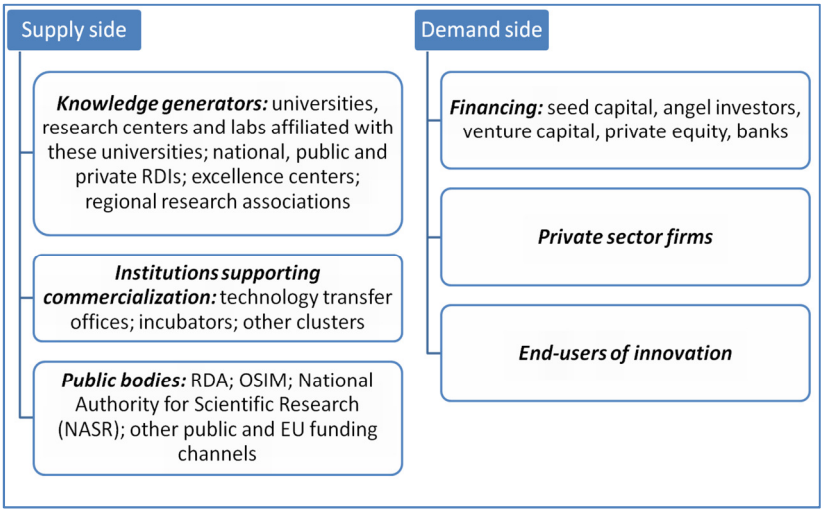
The results to be presented in the current report draw primarily on discussions of the World Bank team with the main suppliers and users of research and development infrastructure and services in the West Region of Romania. These stakeholders have provided invaluable insights to help identify some of the binding constraints faced by the region as well as the opportunities that lie ahead prior to the 2014-2020 programming period.

3. An Assessment of the Supply of RTD Services in the Region

The World Bank completed a Functional Review of the Romanian RTDI Sector in 2011.5 The Review findings draw attention to some national-level limitations such as the lack national level oversight at a sufficiently high level, thinly spread public resources assigned without a strategic focus, poorly monitored public institutes, and gaps in the legal framework for the protection of intellectual property. Most importantly, the Review underlines that R&D and innovation seem to be missing from the political discourse in Romania on how to achieve sustainable growth, which is at odds with the high emphasis placed on this topic by peer countries.

While the national-level constraints identified remain relevant at the regional level, some major constraints specific to the West Region have been identified. The following sections present a brief overview of the main actors in the West region's innovation system as described in Figure 3.

Figure 3 - Key actors in the regional innovation system



3.1. Overview of the region's performance and key actors

The West Region's total investments in R&D as a share of per capita income[6] dropped from 0.3 percent in 2008 to 0.18 percent in 2009, which meant a return to the 2004 level of R&D activity. Over the same period, the EU-27 average for this metric has risen steadily to a stable 2 percent. The Regional Innovation Scoreboard[7] for 2009 ranks all Romanian regions except Bucharest-Ilfov among low innovation performing regions and the West region is no exception to this overall poor performance.

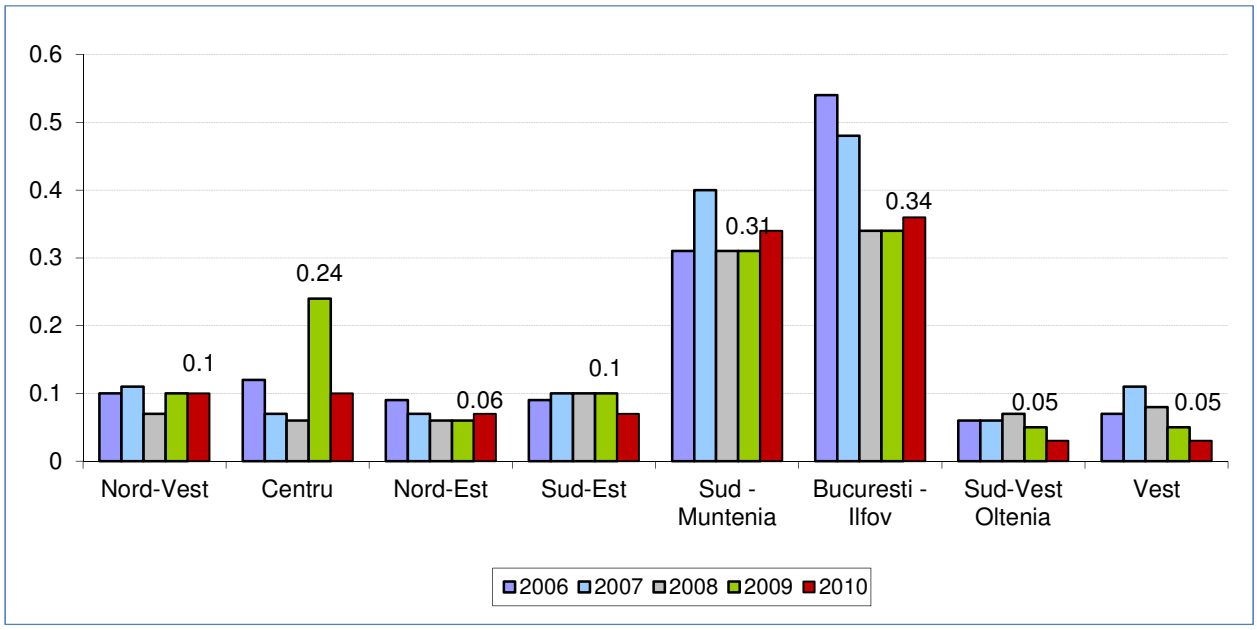
When the R&D spending of the private sector is considered separately, the situation is similar: firms in the West region spent around 0.05 percent of GDP in 2009, which is significantly less than the EU-27 average of 1.25 percent of GDP (Figure 4). Within Romania, this proportion places the West region in the lowest rank, along with South West-Oltenia, in the field of business R&D spending. More recently, information from the Regional Innovation Union Scoreboard (2012), presented as normalized data, shows the West Region fourth in Romania in terms of business R&D expenditure in 2011.

[5] See World Bank (2011).

[6] According to Eurostat data.

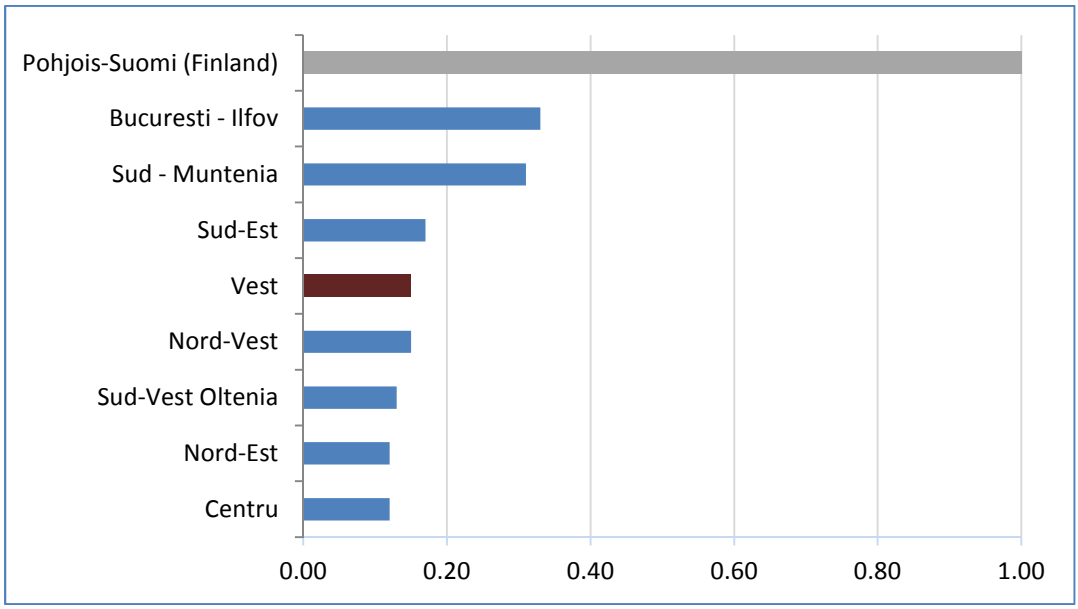
[7] Regional Innovation Scoreboard, Pro-Inno Europe, 2009 report.

Figure 4 - Business Enterprise R&D Expenditures as % of GDP: 2006-2010



Source: Eurostat [rd_e_gerdreg]

Figure 5 - Business Enterprise R&D Expenditures as % of GDP (normalized data): 2011

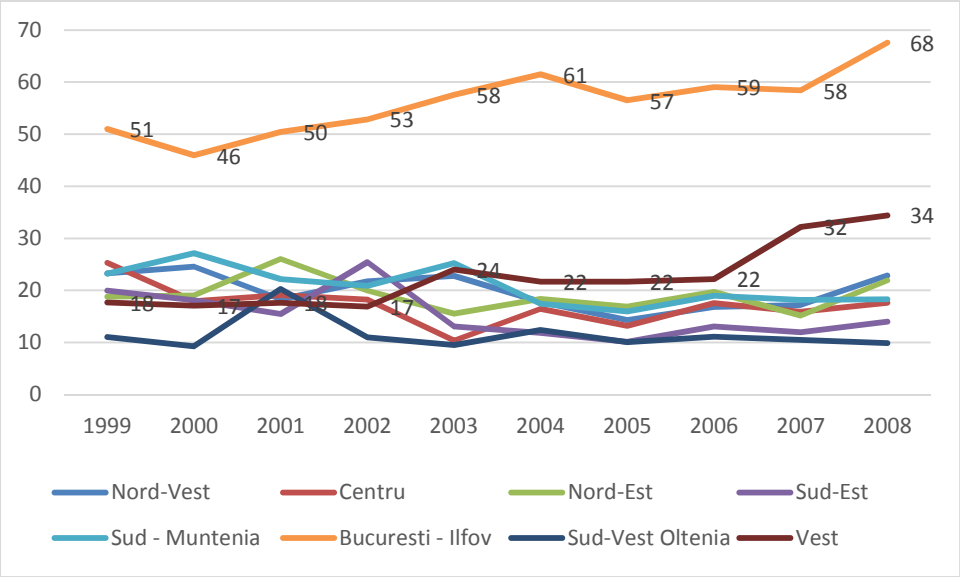


Source: Regional Innovation Scoreboard, 2012
Note1: All R&D expenditures in the business sector (BERD), according to the Frascati-manual definitions, in national currency and current prices as % of Regional Gross Domestic Product, in national currency and current prices.
Note 2: The value of the indicator has been rescaled from a minimum value of 0 for the lowest performing region to a maximum of 1.0 for the best performing region.

The West region is the second region in Romania after Bucharest-Ilfov in terms of employment in high technology manufacturing. The number of people working in high technology sectors in the West region has been steadily increasing since 2006 (Figure 6). In 2008, this number reached 34,000

employees compared to 22,000 in 2006 and only 17,000 in 2002.[8] More recent data (2009 – 2011), presented in Figure 7 shows the West Region following a similar trend, emerging as the second region after Bucharest in terms of employment in high-technology sectors. The indicators are presented here in separate graphs because the classification used for this aggregation in Eurostat changed to NACE 2 in 2008.

Figure 6 - Employment in High-technology (NACE 1) Sectors (thousands): 1999-2008

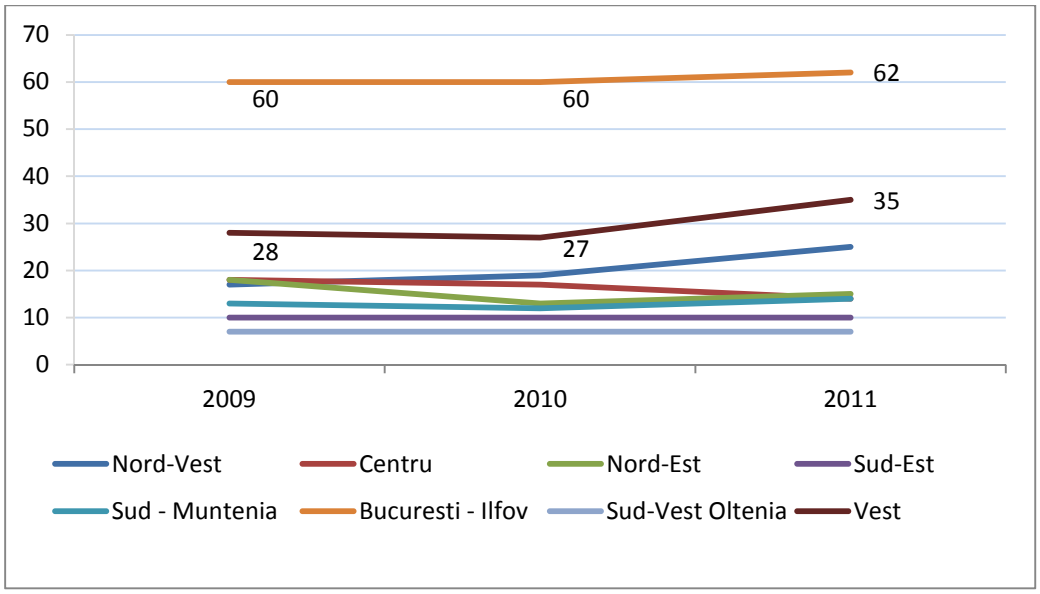


Source: Eurostat. [htec_emp_reg]
Note: high-technology manufacturing and knowledge-intensive high-technology services (**24.4** Manufacture of pharmaceuticals, medicinal chemicals and botanical products; **30** Manufacture of office machinery and computers; **32** Manufacture of radio, television and communication equipment and apparatus; **33** Manufacture of medical, precision and optical instruments, watches and clocks; **35.3** Manufacture of aircraft and spacecraft; **64** Post and telecommunications; **72** Computer and related activities; **73** Research and development.)

However, the number of R&D personnel (full time equivalents) in the West region was about 6 times lower than in the Bucharest-Illfov region in 2010 and among the lowest when compared to other regions in Romania. This number was 1,997 R&D employees in 2010 still below its 2004 level of 2,214 R&D employees (Figure 8). Despite the low levels, the number of R&D employees in the West region has been growing since 2008, whereas, in the Bucharest-Ilfov region it has been declining at a fast pace since 2005, dropping from 20,346 in 2005 to 12,511 in 2010.

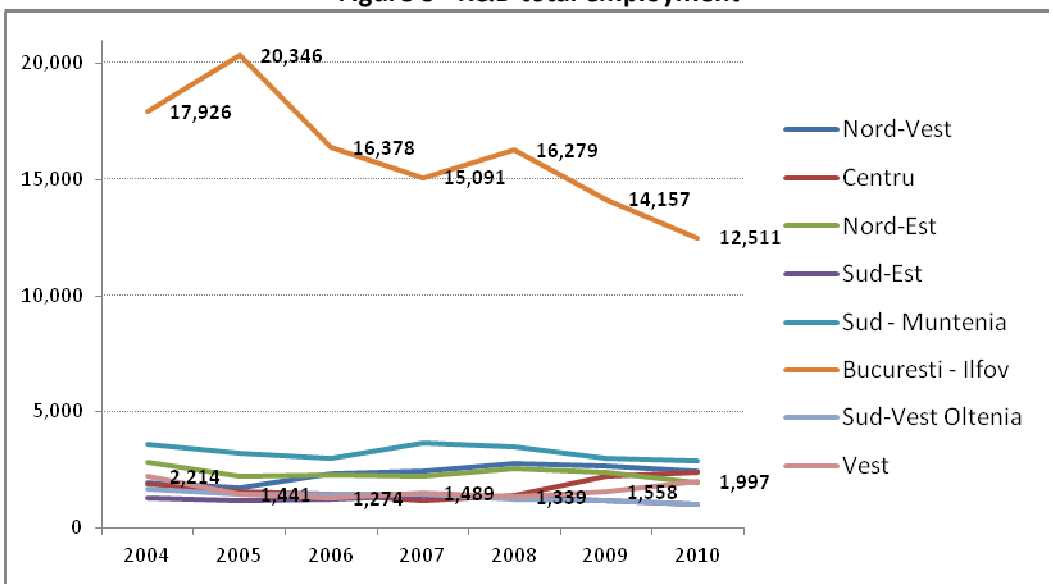
[8] For the 1999-2008 period the identification of high-technology manufacturing and services sectors follows the NACE 1 classification of economic activities.

Figure 7- Employment in High-technology* (NACE 2) Sectors (thousands):2009-2011



Source: Eurostat. [htec_emp_reg2].
Note1: high-technology manufacturing and knowledge-intensive high-technology services (**21** Manufacture of basic pharmaceutical products and pharmaceutical preparations **26** Manufacture of computer, electronic and optical products **30.3** Manufacture of air and spacecraft and related machinery **59 to 63** Motion picture, video and television programme production, sound recording and music publishing activities, Programming and broadcasting activities, Telecommunications, Computer programming, consultancy and related activities, Information service activities **72** Scientific research and development)
Note2: (The data for Sud-Est and Sud-Vest Oltenia for this period is classified by Eurostat as "low reliability". The 2010 indicator for Sud-Vest was missing – it was approximated to 7, same as for 2009 and 2011)

Figure 8 - R&D total employment



Source: Eurostat [rd_p_persreg]

Universities and Research and Development Institutes (RDIs)

There are seven public universities in the West Region, out of which four are based in Timisoara, one in Arad, one in Petrosani, one in Resita. Politehnica University also has a branch in Hunedoara (Annex 5). In addition, there are eight private universities, which are located in Timisoara, Lugoj, Deva and Arad. Specialization areas of these higher education institutions vary, but the region is especially strong in natural sciences, mathematics, computer science, food engineering, agriculture, medical and veterinary sciences.

Requirements for academic advancement differ across universities and faculties. For natural sciences, these include publications, participation in both national and international conferences, and ownership of intellectual property. Previously, commercialization potential of academic research, which can be imperfectly proxied by patents, was not rewarded in the university tenure tracks. Recent changes in the provisions for academic progression allow for a broader range of evaluation criteria with minimum thresholds set by the Ministry of Education.

The most important research institutions in the West region are the National RDIs. Some of these are regional branches of large National RDIs headquartered in Bucharest, altogether covering a large spectrum of focus areas. The capacity and size of these institutes varies considerably, ranging from less than 10 to more than 100 researchers, depending on whether the lab is a branch of a Bucharest-based RDI or if it is an autonomous institution. Likewise, the number of publications in ISI journals and patents held by West region RDIs range from zero up to levels competitive with the rest of the country.

The majority of Romanian research institutions (National RDIs, RDIs under the Romanian Academy, private not-for-profit RDIs, universities and other public research institutions) have access to public financing from the research budget. The National Authority for Scientific Research (ANCS) [9] has launched a certification system to evaluate these institutions in order to reassess the status of National Institutes (where applicable) and to determine, in the case of each RDI, whether the institution meets the eligibility criteria for public funding. According to this classification system, the grades, from the highest category to the lowest, are: A+, A, A-, B and C. Institutions which receive A+, A or A- are eligible for public funds, and can be considered National RDIs, whereas those that receive a B or C grade cannot be classified as National RDIs.

For these evaluations, the ANCS Advisory Council gathers a committee composed of a minimum of 5 evaluators, half of which are international experts. Out of the five West Region National RDIs interviewed, only three had finalized the evaluation process[10], as ANCS had been unable to gather a committee of international experts specialized in the areas of focus of the remaining institutes. Given the timeline provided by ANCS that projected to start evaluating National RDIs in November of 2011, the process seems to be taking extremely long, adding to the financing uncertainty for many of the RDIs.

Major universities in the region have started to invest in technology transfer, but such investments are yet in their early stages. A recent example of an initiative to facilitate the transfer of knowledge to industry is the joint e-Austria institute formed with the participation of the Computer Science Departments of the West and Politehnica Universities and the Research Institute for Symbolic Computation at the Johannes Kepler University in Linz. The institute has ongoing projects with private partners in Austria, Germany and Romania. Another example of the recent efforts to foster collaboration between universities and the private sector is the provision of agriculture extension

[9] Autoritatea Nationala pentru Cercetare Stiintifica

[10] These institutes were reported to have obtained top grade in the certification.

services by the Banat University of Agriculture and Veterinary Medicine (this project was initiated with a contribution from the World Bank MAKIS project funding in 2008).

Infrastructure

Industrial parks are located in a variety of locations- in Arad, Resita, Hunedoara and Timisoara, but no technology park exists in the region that could provide support services for innovative activities. A section of the Timisoara Industrial and Technological Park (PITT) project was initially designed to serve as a technology park, but financing constraints prevented the development of the technology leg of the project.

The West Region has a fluctuating supply of infrastructure and services provided to support innovative firms, especially in the ICT sector. Until recently, the region used to host one business incubator focused on ICT (Timisoara Business Incubator, UBIT), which organized trainings and networking events for its tenants. UBIT was initially funded by the County, the City, and Politehnica University and offered its tenants 75% subsidy on rental space in addition to the above-mentioned activities. Currently, the City and the County both have separate projects for ICT sector incubating facilities, while Politehnica continues to host the companies on subsidized rent, but the UBIT building no longer serves as an incubator.

A private initiative for ICT sector incubation facilities is the Start up Hub located in the City Business Center. Pro bono activities of the community target potential entrepreneurs and ICT enthusiasts from a wide range of age groups; from school age children as young as seven year-olds, to high school and university students. For entrepreneurs, networking events, workshops and trainings are organized with the aim of supporting new firms in the ICT sector. However, financing constraints limit the capacity to institutionalize the activities of Start up Hub.

Innovation finance

The main public funds available for research and innovation are provided by either the European Union (EU) or by national funds and are mostly managed by ANCS at the national level. The allocation of these funds to certain activities follows the guidelines set by the National Research, Development and Innovation Strategy. In Timisoara, ANCS has a liaison office which organizes local seminars to disseminate information about available financing, assists with applications at the local level, and reviews application documents from local candidates, but project funding decisions are made at the central level in Bucharest.

Banks are another available source of financing for the private sector, but large collateral requirements and the high cost of borrowing are among the factors which render bank financing less accessible and desirable for entrepreneurs. The difficulty of obtaining bank credit also has some repercussions on access to European funds, as this type of financing requires a bank guarantee equal to the amount made available to the private actors. European funds are released once the applicant achieves a pre-determined performance target in relation to the financed project. This requirement is perceived as a risk by private stakeholders and constitutes a reason to avoid using this type of funding wherever possible.

A few recent investments by local business angels, though minuscule in number so far, seem to offer a promising source of funding and mentorship for early stage innovative activity to be considered in the future. Another fund that was recently made available at the national level is Catalyst Romania, which was launched in late 2012 as a result of collaboration between the European Commission, the European Investment Fund (through the JEREMIE instrument), 3TS Capital Partners and Banca

Transilvania Asset Management. The fund is planned to invest between 200,000 and 2,000,000 Euros in small companies in the ICT, media and services sectors.

Other actors

Tehimpuls, an office established in 2006 within the West Region Development Agency (ADR Vest) to act as an interface between the regional actors in the innovation system, is well-positioned to promote innovation and to facilitate interaction between the R&D units and the private sector actors in related industries. The database of research offers and requests published by Tehimpuls provides information regarding research activity at universities and RDIs for the knowledge and use of the private sector. In addition, the office has a significant role in fostering communication between the parties through fairs and other gatherings.

There are two sector-focused clusters formed to facilitate interaction and cooperation between the actors operating within these sectors. The automotive cluster was established in 2007 and the ICT cluster was inaugurated in 2011. Led by the ADR Vest, these clusters gather a large number of stakeholders including, but not limited to, private sector firms and associations; universities; RDIs; members from Timisoara, Arad, Deva City Halls; and Timis, Arad and Caras-Severin County Councils. [11]

3.2. How Can the Local RTDI Ecosystem Contribute to Increase Competitiveness in Key Economic Activities?

The research and technological development infrastructure of the West Region is essential for the economic development of the area. This role can be fulfilled via two main channels: commercialization of research conducted within universities and research institutes, and public instruments to enhance private sector innovation efforts.

3.2.1. Commercialization of research at universities and RDIs

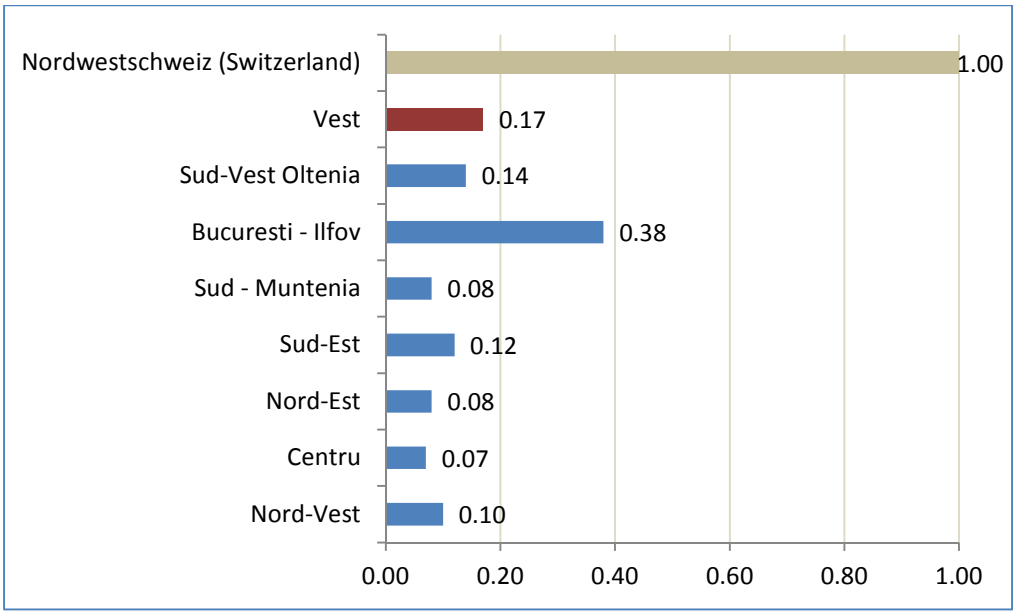
Incentives for academic research, funding and collaboration with the private sector

The promotion criteria in academia continue to offer very few incentives to conduct research at international standards. In 2007, academics of the West Region have produced 45.4 scientific publications per million inhabitants[12], which is about a third of the amount produced in the Bucuresti-Ilfov region. By this comparison, the West region ranks fourth in the country, slightly below the North-West region, and 250th out of 268 EU regions at the NUTS2 level. More recently, information from the Regional Innovation Union Scoreboard (2012), presented as normalized data, shows the West Region second after Bucharest in 2011 when it comes to the number of public-private co-authored research publications (PPCs) over total publication output. However, Western Romania is significantly lagging behind compared to the best performing region in the EU (see figure below).

[11] A full list of participants in each cluster can be obtained from the ARD Vest. The list provided here is not exhaustive.

[12] Thomson Reuters Web of Science & CWTS database (Leiden University).

Figure 9 - Public-private co-publications (normalized data): 2011



Source: Regional Innovation Union Scoreboard, 2012
Note1: *Note:* Number of public-private co-authored research publications (PPCs) over total publication output. The definition of the "private sector" covers business enterprises and for-profit organizations, but excludes the private medical and health sector. Publications are assigned to the region in which the private sector organization is physically located.)
Note 2: The value of the indicator has been rescaled from a minimum value of 0 for the lowest performing region to a maximum of 1.0 for the best performing region.

Interviews with university representatives have revealed that this low ranking is due to a great extent to a long-standing tradition according to which many academics still focus solely on their teaching duties and ignore the research component required by their positions. It was reported that this mentality problem is slowly diminishing, as the new standards reward success in research efforts.

A major issue that constrains the national RTDI ecosystem is the lack of political ownership for research and innovation, which leads to policy uncertainty for potential innovators, reducing the probability that they will engage in substantial innovative activities. Regardless of political color, policy makers should agree on an objective set of necessary reforms to achieve the country's R&D, innovation and technology goals. The latest examples of policy reversals have taken place in the areas of human resources funding and the criteria for academic advancement.[13]

Across Romania, the scarce resources for research and innovation are thinly distributed to a large number of RDIs, with a high loss of efficiency, and the West Region is no exception. In Finland as a whole, there are only 18 RDIs, while the West Region hosts about 90 RDIs, of which 38 are state-run[14]. The World Bank Functional Review (2011) has pointed out that: "the fragmentation and the large number of RDIs devoted to a wide range of scientific fields [are not] the most efficient way to allocate resources…". The West Region needs to consolidate its RDI system and the funds that are channeled to these institutes.Available public funds for both universities and RDIs target mainly basic research, overlooking the importance of the proof of concept, early-stage technology development, product development and commercialization phases of the invention process, in other words, the "innovation"

[13] The details of these policies are beyond the scope of this study.
[14] Source: Regional Innovation Monitor, Regional Profile for RO42.

aspect.[15] The real value creation and productivity gains in the economy from the applications of research and development activities only occur in these latter stages. Even for financing basic research, public funds available to RDIs have been falling, with the prospects of further decline in the future due to the financial crisis. The uncertainty is aggravated by the fact that the ANCS evaluation of the institutes is yet to be undertaken in some cases. Cross-border cooperation projects alleviate this problem for some of region's RDIs, but capacity remains low. In order to hire good researchers, the well-performing RDIs in the region rely on funds generated through consultancy, training, testing and certification activities. Such services provided by RDIs are crowding out research activities.

Best practices show that under reliable prospects for commercialization, the research efforts of an RDI or a university could constitute a large proportion of its income, which would ideally be contracted by the private sector. Yet, in the West Region private sector demand for the research performed at RDIs and universities is reported to be extremely low, due to the information asymmetry between the RDIs/universities and firms. The large number of inefficient RDIs blurs the private sector's ability to select the well-performing RDIs, stalling collaborative projects.

At the heart of the West Region research and innovation strategy should lie the target to strengthen the collaboration between knowledge suppliers, mainly the universities and efficient RDIs, and the private sector. There has so far been a heavy focus on the "research" side with an effort to support the large number of RDIs. This focus should shift to the "innovation" side by developing projects that incentivize the development of practical applications in a collaborative manner.

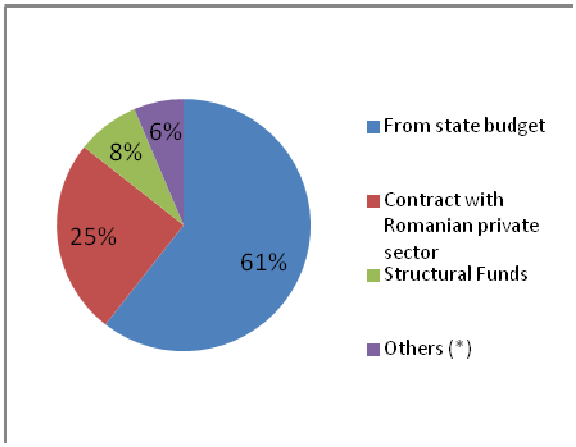
The automotive cluster has so far been instrumental in facilitating such university-industry collaboration. The recent ICT cluster is expected to also generate a platform where university researchers meet the private sector. Some sub-fields enjoy a critical mass thanks to a few good collaborative research projects between RDIs and the private sector. Such projects take place in the areas of welding, (for example ultra sound welding for railway fabrication), plastic molding, automotive sector applications (for example quick drying technology for automobile paint), mine safety and explosion. In the field of ICT, the e-Austria Institute is a good initiative which offers practical solutions to the private sector. Sector specific technology transfer or innovation offices may be useful in strengthening such relationships and allowing the knowledge producers to be better able to meet private sector demands.

Tehimpuls has a different and broader coverage than a specialized technology transfer office, and therefore, its function to support the full life cycle of an invention is limited by capacity and funding constraints. Given the wide spectrum of industries covered by these activities, it remains a challenge to improve the outreach and provide tailored solutions for specific commercialization projects.

National RDIs in the West Region have seen their budget for research decline in recent years due to the economic downturn, while the proportion of income from the private sector has increased to reach 50% on average (see Annex 3 for a detailed breakdown). This is different from the budget composition of all National RDIs, for which the majority of the budget still comes from the state (61%) and includes also a sizable share of structural funds (8%) (Figure 10 and Figure 11). However, based on the interviews carried out as part of this analysis, it appears that in many cases the private sector does not buy research but requires testing, consulting and accreditation services.

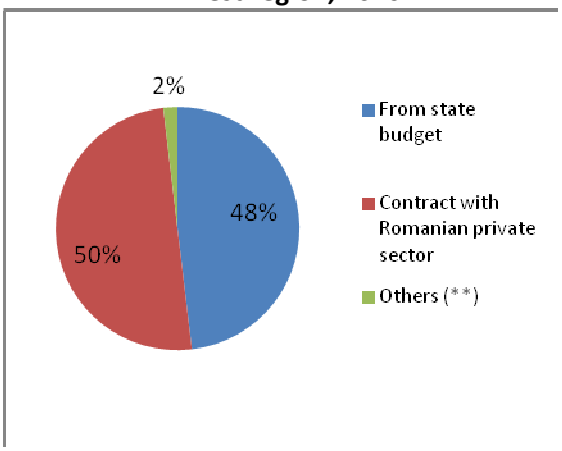
[15] Based on the Sequential Model of Technology Development and Funding, by Branscomb and Auerswald (2002).

Figure 10- Funding of National RDIs, 2010



Source: ANCS Survey on 47 national RDIs
Note: include Contract with foreign firms, direct funding from ANCS and MERYS, and FP6-FP7

Figure 11- Funding of National RDIs located at West region, 2010



Source: ANCS Survey on 47 national RDIs
Note: include Contract with foreign firms, direct funding from ANCS and MERYS, and FP6-FP7 and Structural Funds National RDIs in the West Region: INCD ECOIND, ISIM, INCEMC

There is a large heterogeneity across capacities of West Region RDIs. While some RDIs perform research at the international standards, most RDIs survive thanks to public funds, or the additional services that they provide outside research or innovation. Consolidation of RDIs may allow the government to provide better support for the research activities of the few efficient RDIs, while using the remaining funds to support more practical research and innovation.

Research and innovation of a new or improved product or process is costly, and the universities/RDIs are unable to communicate to firms the extent of the costs on the outset, which suggests the region may benefit from intermediary bodies which could facilitate better communication. Interviews have revealed cases of projects which were withdrawn after long negotiations between the private sector and the university/RDI researchers. In these cases, collaboration was initially proposed by the private sector, but when the university/RDI launched the project, the funding offered by the firm fell far short of the research costs. Another difficulty faced by the universities/RDIs in partnership projects was the inefficiency and red tape involved in procurement procedures which slowed down the ability of research institutions to adapt to the changing demands of the partner firms.

It is difficult for RDIs and universities to retain well-trained young scientists and engineers due to the uncompetitive salaries and lack of funding. The best students in the graduating classes of the Politehnica and West Universities prefer to work for the multinational companies located in the region, to emigrate to pursue further studies abroad or to work in the private sector in other countries. The scarcity of good researchers at RDIs causes the quality of research to remain extremely low in these institutes, and only those RDIs which have strong collaboration with the private sector continue to undertake research which can compare with international standards.

Academic entrepreneurship

To create a culture of academic entrepreneurship, researchers at universities and RDIs need to better understand the idea of commercialization through licensing and spin-off companies. Researchers still have extremely limited knowledge on these various mechanisms available to them for

commercializing their work. In addition, universities in the West Region have no institutional knowledge that would allow them to assist members in order to promote their ideas in the market.

There are a few examples of successful university spin-offs in the region, which established private sector connections through personal contacts, but these did not benefit from any assistance from their respective universities, and did not obtain seed or angel investment in the early stages. In fact, these new enterprises are still facing serious funding problems. Universities do not currently have any departments such as marketing divisions for university R&D or targeted technology transfer offices. These facilities can help entrepreneurial academics to access funds, apply for intellectual property protection, or approach clients.

In addition to the gaps in the incentive mechanism, an important reason for the limited number of university spin offs is the lack of focus on applied research. Publications by many academics in the West Region are concentrated in theoretical fields and basic research, which have little potential for commercialization without extensions in application. Part of the reason for this is the funding gap for more applied work, while part is attributable to the academic tradition that persists in the region's universities. In order to extract productivity gains from this knowledge stock, an emphasis on applied sub-fields is essential. This, on the other hand, should not mean abandoning the existing work on theoretical topics.

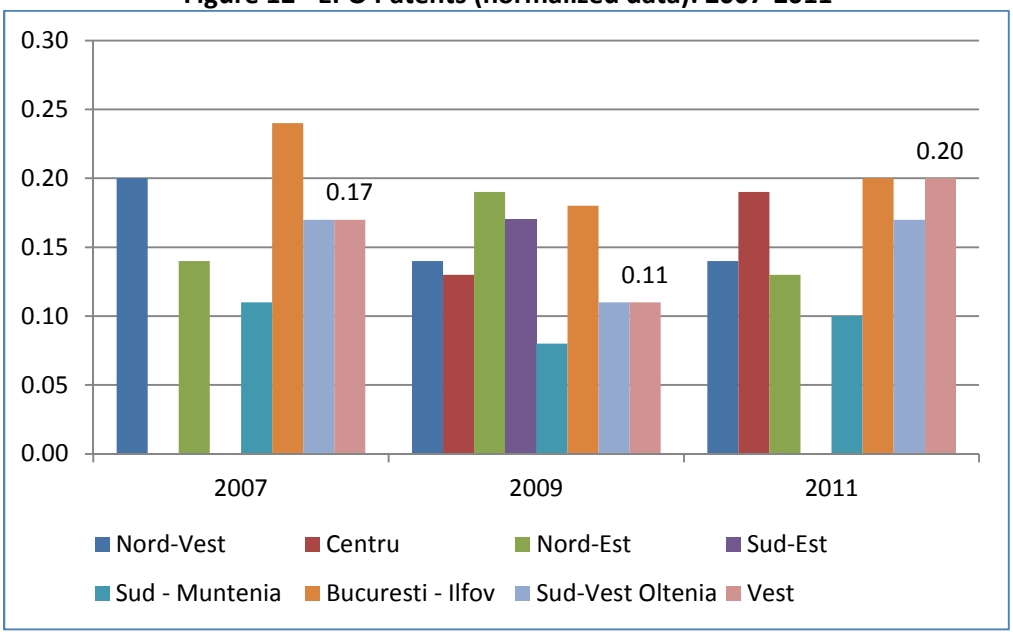
Intellectual property

In 2008, the West region had only about 7 EPO patent applications (per million labor force), according to Eurostat, fewer than in Bucharest-Ilfov (14), but more than other Romanian regions which had 0-2 applications per million labor force. Despite the seemingly better performance in comparison to the Romanian average, the West region is drastically lagging behind comparators in the rest of the EU in terms of intellectual property protection for its inventions. For instance, in 2008, Del-Alfold and Eszak-Alfold in Hungary made 35 and 14 patent applications per million labor force, respectively. In the regions of highly developed countries in the EU, this metric ranges between 100 and 800.

During the interviews conducted as part of this analysis, the high costs of hiring patent attorneys emerged as the main reason for the low score in international patenting. A secondary reason was the lack of "vision" and knowhow necessary to approach international bodies in order to apply for patents and to exploit their commercial value to the fullest extent. Even in cases where an EPO or USPTO patent is granted, stakeholders in the region do not have much experience with licensing and not sufficiently aware of the potential gains from such activities. In most cases, the overall costs of patenting are believed to exceed the benefits, partly due to the lack of clarity in the rules governing the ownership of intellectual property (See Box 1).

Information from the Regional Innovation Union Scoreboard (2012) shows a mixed performance for the West Region in terms of EPO patents in comparison with the other regions of Romania. The West Region appears to be catching up with Bucharest according to the most recent data (see Figure 12).

Figure 12 - EPO Patents (normalized data): 2007-2011



Source: Regional Innovation Union Scoreboard, 2012
Note1: Number of patents applied for at the European Patent Office (EPO), by year of filing. The national distribution of the patent.
Note 2: The value of the indicator has been rescaled from a minimum value of 0 for the lowest performing region to a maximum of 1.0 for the best performing region. Best performer: Noord-Brabant (Netherlands).

Patent applications, where available, are predominantly for national patents. Romanian patents are perceived mainly as a tool for academic career advancement, while the creation of real commercial value through intellectual property is close to non-existent. Research centers and project budgets allocate a small amount of annual of funding, if any, to obtain local patents in Romania (for example, US$ 1,400 allocated in 2011 for 1 patent at the Physics Institute at West University). It is not commonplace to make formal assessments of the commercialization potential of existing patents.

The cost of an application for an EPO patent can be included in the project proposals, as Aurel Vlaicu University, located in Arad, has done on some occasions. Aurel Vlaicu University consults an IP advisor to help file the EPO patents. The services provided by this IP expert cost around EUR 30,000 per application. According to discussions with interviewees at Aurel Vlaicu University, the assessment of novelty of specific research results was made by the principal investigator, who is familiar with the latest developments in the relevant scientific fields.

Box 1- Intellectual Property Legislation and Protection in Romania

Romania has a number of regulations on IP including laws no. 64/1991 on patents, 8/1996 on Copyright and Related Rights, ordinance no. 57/2002, Laws no. 350/2007, 129/1992, and 1134/2010, among others. There are several contradictions in these laws regarding invention ownership and its transfer. This creates negative views among business representatives based in Romania as well among potential foreign investors. For instance, according to the Patent law (64/1991) that applies equally to public and private sector, in order to have ownership rights to an invention, a person is required to register the invention in the patent office (the law states 'The right to the patent belongs to the inventor or his successor in title (…) Any person who has submitted, (…) a patent application with OSIM or successor in title, shall have a right of priority, starting from the filing date from any deposit, on the same invention, having a later date'). On the contrary Ordinance 57 and 6/2011 aim to assign the ownership of the research results funded from public resources to the RDIs (law states: 'research results obtained from execution of a contract research and development or innovation partly or wholly financed from public funds belonging to contractors directly performing activities under the grant agreement and / or employees, under funding contracts and legislation effect on industrial property and copyright). Moreover, there are contradictions in 8/1996 law related to software, where some articles protect an author of the invention while others protect the employee's right.

Source: Quoted from the Romania Research, Development and Innovation Sector Functional Review, 2011 (p. 33)

3.2.2. Public Instruments to Enhance Private Sector Innovation

Public funds

ANCS-administered funds have been reported to have three major drawbacks for innovative firms in the region: (i) amounts and availability have declined severely in the aftermath of the crisis, both because the 2007-2013 programming period has been drawing to a close and also due to adverse economic conditions; (ii) long processing times for the existing funds caused some projects to become outdated; (iii) policy uncertainty regarding some funding sources, as explained in the preceding paragraph.

While most of the key sectors are reluctant to use public funds due to extremely long approval processes, the ICT sector, because of its dynamic nature, suffers the most when using public funds available for research. Even after a funding decision has been made, the amount of time taken by the authorities to monitor the project, and bureaucratic difficulties throughout the project implementation stage are particularly burdensome. All these processes usually occur before reimbursement, adding to the financial uncertainty for the innovators. In the case of the ICT sector, in a year's time the innovative product becomes obsolete and loses its market.

The reimbursement principle has led some beneficiaries of public research funds to bankruptcy during the crisis period. Lack of financing and the reimbursement conditions specified by the contracts are major problems for the firms undertaking research and innovation projects. The interviews have revealed that some firms committed to projects which relied on public funds that were allocated for research, but due the lengthy process of project approval, implementation and reimbursement, some of these companies failed to sustain the project and needed to liquidate.

Box 2- Main Public Sources of Financing for RTDI

The Ministry of Education, Research and Innovation provides funding for the core research and development programs, also administered by the ANCS. The goal of these programs is to support national research and development institutes, research institutes, centers, stations of the Romanian Academy and R&D units belonging to branch academies. There are *six national funding programs* under the National Plan for Research, Development and Innovation, each of them designed to address a specific aspect of the RTDI ecosystem.

i. *The program focused on Human Resources* aims to increase the number of researchers and their professional performance. The beneficiaries of this program are "research-development staff" and "R&D&I entities". The available budget is 1,350M RON or approximately $380M.

ii. The program focused on Capacities aims to open the RDI system towards international scientific environment and national socioeconomic environment. The beneficiaries are RDI entities, private sector firms with their own RDI activity. The available budget is 2,205M lei or approximately $570M.

iii. The program focused on Ideas aims to obtain high-end scientific and technical results in basic research, mainly in the fields of biology, genetics, medicine, chemistry, environment, material science, mathematics, physics, technological physics, geology, atmosphere physics, border fields. Workshop organization is envisioned, among other initiatives, with the aim of identifying "unexplored knowledge niches". The beneficiaries are R&D staff andRDI entities. The available budget is 2,300M RON or approximately $7,60M.

iv. The program focused on Partnerships in High Priority Fields aims to increase competitiveness of R&D in priority research fields, such as: CIT, energy, environment, healthcare, agriculture, food safety and security, biotechnologies, innovative materials, processes, and products, space and security, social-economic research, and humanistic research. The beneficiaries are collaborative projects (RDI consortia involving RDI entities, companies or local or central public administration units). The available budget is 5,400M RON or approximately $1,515M.

v. The program focused on Innovation aims to increase the capacity for innovation, technological development and assimilation of research results into production. The beneficiaries are:, (i) companies partnering with RDI entities or (ii) local public administration units in partnership with technological transfer entities or RDI entities;(iii) economic agents in collaboration with, RDI entities or; (iv) RDI entities partnering with economic agents, local public administration, technology transfer entities, or other RDI entities. The available budget is 2,025M RON or approximately $568M.

vi. The program focused on Institutional Performance aims to provide continuity and stability for the activity of RDI entities, aiming towards the implementation of own development strategies; institutional development. The beneficiaries are national research and development institutes, post-secondary education institutions, and other non-profit research entities. The available budget is 1,500M RON or approximately $421M.

In addition to funding provided by national programs, financial resources for the support of RTDI are also available through the EU Cohesion Fund (CF) and Structural Funds (SF), as part of sectoral operational programs, including the Operational Program for Increasing Economic Competitiveness and the Sectoral Operational Programme on Human Resources Development.

The Operational Program for Increasing Economic Competitiveness (POS CCE)[16], which aims to increase competitiveness level, by focusing on public as well as private actors, especially SMEs. Among other goals, these programs aims to increase the productivity of enterprises via support in several areas, including: acquisition of new equipment, technologies, or know-how; modernization of technologies, and the acquisition of licenses; innovation in the production processes and the products; adoption of international standards and certifications; modernization and accreditation of testing and gauging labs; expansion in new markets; measures to ensure sustainability. Another priority of this program is to maintain sustainable entrepreneurship development. To this end, it supports SMEs' access to consultancy services. Research partnerships between universities, research institutes and enterprises is supported under one of the axes of this sectoral operational program (SOP), with an emphasis on healthcare, agriculture, food safety and security, energy, environment, materials, innovative products

[16] Programul Operational Sectorial Cresterea Competitivitatii Economice

and processes. In addition, the program supports projects which involve international experts in R&D institutes, universities, enterprises. One of the "intervention fields" under the competitiveness axis is "enterprise's access to research, development and innovation activities" through support for innovative startups and spinoffs, development of the R&D infrastructure of private firms, and innovation activities within firms.

The Sectoral Operational Programme on Human Resources Development (SOP HRD) focuses on the development and increased competitiveness of human capital, by connecting the education system with the requirements of the labor market.

Local training specializations and economic activities

There are ongoing efforts to align higher education curricula and training specializations with local economic activities, based on traditional specializations. A good example is the interaction between the University of Petrosani and the National R&D Institute for Mine Safety and Protection to Explosion (INSEMEX), whereby the University offers a mining study program which is in line with the local economic activity and the highly specialized focus areas at INSEMEX. This allows the RDI to employ high skilled researchers upon completion of their degrees and offers students at the University of Petrosani to apply for internships and part time jobs at the institute. Another example is the newly developing practice of agriculture extension services at USAMVBT.[17]

The alignment of higher education curricula with emerging local specializations is being established by the participation of private sector representatives in the consultative councils of universities, in exchange for attractive future employment opportunities for their students. Universities have reported that the "private sector is heard" when decisions about curricula are made. From the private sector's point of view, the Automotive and ICT clusters have been useful in achieving this type of coordination to a certain extent.

Unfortunately, the more common scenario is the lack of alignment, especially between higher education institutions and the private sector. As a result, the availability of suitable skills in the region has been reported as a major challenge posed by the education system, which is slow in adopting a more applied curriculum, and lacks the focus on multidisciplinary approaches and teamwork. In its turn, the private sector is criticized for not being fully involved in the education processes, but merely interested in the recruitment of good students rather than in contributing to the education system.

The universities and public officials also expressed concern that the skills demanded by the large multinational enterprises (MNEs) in the region are too specialized and rigid (for example, development of expertise in a specific design software, or CNC machinery operation). This narrow view of the university level education is at odds with the current educational paradigm, which encourages students to develop a variety of capabilities through reasoning and searching for information on their own.

To achieve productivity gains from local skill formation, it will be important to incentivize the private sector to consider long term investments in the regional university system, promoting the inclusion of multidisciplinary approaches, practical courses and internships, both in the curricula of technical programs and as separate certification courses. When the private sector requires specialized practical knowledge, it should be willing to offer such courses jointly with the university, through open communication and constructive dialogue between the parties. The current practice of simply acquiring the best students is unlikely to help expand the skill set available in the region.

[17] Banat University of Agricultural Sciences and Veterinary Medicine

At the medium skill level, the scarcity of market-relevant vocational training and low number of students who choose to attend this type of schools has been reported as a drawback of the national education system. The issue is one that should be addressed at the national level, but at this stage it is worth highlighting the importance of accumulating a pool of specialized medium-skill labor force.

Infrastructure

In general, business incubators are designed to help startups through their initial years of establishment by providing services such as access to utilities (internet connection, electricity, telecommunications, logistics), marketing and sales assistance, capacity building activities including trainings for employees, mentoring, intellectual property advice and management, connections with investors, and more. In return, incubators monitor the progress of their tenant startups, and usually have a firm graduation requirement beyond which point the companies are required to sustain themselves. This ensures that incubators do not turn into hard infrastructure facilities that only offer rent at lower prices than the market.

There are incubation facilities in the region that host a variety of sectors, ranging from labor-intensive activities such as clothing/tailoring, to web design and other ICT-related areas. One of the incubators that started out as an ICT-only facility was UBIT, which no longer offers the value added services listed above. Currently, UBIT only serves as an office building that offers reduced rent space within Politehnica.

In its early years, UBIT had defined a graduation policy, which required tenants to leave the incubator after two years, but this requirement was never enforced because of a lack of demand. The incubator, during its active years, never achieved full capacity, despite the fact that the services offered by UBIT were the best available in the region.

While it was serving as an incubator, UBIT organized and hosted many activities including mentorship and training, but had no market test for its services, which were offered pro bono. There are still promising efforts to create local tech “communities”, but these are the result of voluntary initiatives by the involved actors and do not create any funding to support the sustainability of such activities. In the incubators that are being inaugurated currently, the implementation of as costing mechanism for such activities and an associated revenue-generation channel, may reduce the reliance of the incubator on funding from public actors.

No structured mentorship programs are available in the region. UBIT offered one mentoring scheme (with an individual mentor), but the incentives for mentors were not clear (mostly voluntary). Best practices in business incubators pair up mentors with firms based on a mutually beneficial relationship: mentors need an incentive to prepare the incubated firms for larger scale activities. Many times these incentives take the form of shareholding, or simply the right to take a first look at the technology that the incubated firms are developing and the opportunity to participate in the ownership and management of intellectual property. Mentors also facilitate the access of firms to investors.

In terms of ongoing business incubators projects in the region, the supply of infrastructure (i.e. space and services) is likely to be unbalanced in comparison to local demand. For instance, the Timis County and the Timisoara City Councils are each investing in large business support infrastructure projects for the IT sector, but local stakeholders have expressed concerns over the lack of a proper demand assessment and the potential excess supply of infrastructure in the specific sector. The occupancy rates at former UBIT are also informative of the excess supply of such services.

Industrial parks in the region have been hit by the financial crisis as many tenant firms have either stopped or suspended their operations in the region. In the periphery of the West Region, tenants

of industrial parks are companies which activate in medium-low technology sectors such as mining, metal processing, construction, electric components and textiles. Foreign companies which reside in the industrial parks tend to bring the equipment and knowhow from their home countries and not develop any technology in the region.

3.3. Main regional research projects and potential links with strategic sectors

As shown previously, there is not enough investment in R&D and innovation activities in the region to help establish a cluster of sophisticated and value added activities. Nevertheless, there is evidence of existing opportunities to unleash the innovative potential in key economic sectors (to be further analyzed in the following chapter).

In the **automotive sector**, collaboration with research organizations is facilitated through personal connections and the cluster. The most important drawback of the RTDI system for this sector is the supply of qualified engineers with practical knowledge required to work on design and development, as the theoretical focus at universities is once again underlined as a drawback of the system.

In the **textile sector** R&D is mostly conducted by the multinationals, which are clients of local producers, leaving to local companies only the production stage of the process. This exercise has low added value, and recently the local companies operating in the sector have started to introduce new technology in order to produce full products rather than only components.

As a result of the significant human capital supplied by regional universities, the **ICT sector** in the West region emerges as an internationally competitive player, not only in software development activities, but also for the higher value added activities, including design and engineering.

In the **agro-food sector**, the most important concern is the lack of trust on the private sector's side in the quality of research undertaken at universities and RDIs. Part of this problem is caused by an information asymmetry between the private sector and universities/RDIs, and part has to do with the ability of universities to respond to the needs of the private sector.

The **construction sector** has recently begun to engage in collaborative projects with the university and RDIs (apart from certification and consultancy) and companies report that the bilateral relationships with Politehnica University have been producing promising results. Most of the R&D projects in this sector focus on energy efficiency solutions.

In the **tourism sector** competitiveness is strongly linked to the creation of a regional innovation system that can facilitate the absorption of knowledge and its dissemination. In this context, a strong collaboration with the West region ICT cluster, universities and cultural stakeholders is necessary to promote the West region as a tourism destination.

Against this background, the table below highlights a number of key emerging projects undertaken at regional research institutions, as well as potential links between these research areas and strategic sectors or clusters in the West Region (see Chapter 4 for a detailed sectoral overview).

Table 1- Example of R&D projects in key sectors

Institution	Project	Funding	Sector	Niche (if specified)
Universitatea Politehnica din Timisoara	Institute of Research for Renewable Energy ICER-TM	EU (POS CCE)	Renewable energy	
Universitatea Politehnica din Timisoara	Collaborative R&D project with SC Consiron Srl	EU (POS CCE); SC Consiron 55%	Renewable energy	Photovoltaic plant, equipped with high-power LEDs
Universitatea de Vest din Timisoara, Universitatea Politehnica din Timisoara	e-Austria Institute	EU FP7, national funds, private sector	ICT	Various
Universitatea de Vest din Timisoara	IBM Blue Gene Supercomputer, unique in Romania	EU (POS CCE)	ICT	High performance computing
Universitatea de Vest din Timisoara	HOST - High Performance Computing Service	FP7	ICT	High performance computing
Universitatea de Vest din Timisoara	AMICAS - Automated Management in Cloud Computing and Sky	National	ICT	Cloud computing
Universitatea de Vest din Timisoara	HP-SEE - High Performance Computing Infrastructure for South East Europe's Research Communities	FP7	ICT	High performance computing
Banat University of Agricultural Sciences and Veterinary Medicine	Extension Unit	EU (POS-CCE) and the World Bank (MAKIS project 2008)	Agro-food	Agriculture extension services
Banat University of Agricultural Sciences and Veterinary Medicine	Overall research focus	Various	Agro-food Environment	breeding varieties and hybrids; sustainable technologies; sustainable use of agricultural land; food science research; domestic animals protection; genetic engineering; farming technologies…
Aurel Vlaicu University Arad, collaboration with 13 universities and institutes	NANOFOL	FP7	Medical sciences	Folate-based nanobiodevices for integrated diagnosis/therapy, targeting chronic inflammatory diseases
Aurel Vlaicu University Arad	Liberian plants	EU (POS CCE)	Textile	

Institution	Project	Funding	Sector	Niche (if specified)
Aurel Vlaicu University Arad, collaboration with laboratories from Europe and USA	Marie Curie Biological mass spectrometry	EU (not specified)	Medical sciences	
National RDI for Welding and Material Testing	Activities in ultra sound welding	National, EU, private	Transport	Auto, naval (including vessel construction), railways
National RDI for Electrochemistry and Condensed Matter, collaboration with University Aurel Vlaicu (Arad), University of Medicine and Pharmacy Victor Babes (Timisoara), University of Medicine and Pharmacy Carol Davila (Bucharest)	The Identification and Characterization of Brain Cancer Biomarkers Expressed in Serum and Cerebrospinal Fluid through Advanced Glicomic Methods Based on Mass Spectrometry	National	Medicine and medical instruments	
National RDI for Electrochemistry and Condensed Matter, collaboration with Banat University of Agricultural Sciences and Veterinary Medicine and Politehnica	Novel piezoelectric sensors based on α-quartz type materials for safety and quality control in food industry – SENZALI	National	Food industry	Development of a laboratory-scale technology for solar photocatalytic hydrogen.
National RDI for Electrochemistry and Condensed Matter in collaboration with National Research and Development Institute for Cryogenics and Isotopic Technologies and Institute of Chemistry in Timisoara	Solar photocatalytic hydrogen production using industrial sulphurous wastes – H2SOLAR	National	Renewable energy	
National RDI for Electrochemistry and Condensed Matter	Renewable Energy Laboratory	EU (POS CCE)	Renewable energy	Laboratory facilities for renewable energy - photovoltaic performance tools and equipment

Institution	Project	Funding	Sector	Niche (if specified)
National RDI for Mine Safety and Explosion Protection	Overall research focus	Various	Chemicals, industry	Mine safety and explosion
National RDI for Industrial Ecology	Activities in water, soil, wastewater treatment	Various	Environment	Manufacturing, electrochemical metals, pharmaceuticals, textiles, mining (copper)

3.4. Considerations for Policy Actions

In order for the research and innovation infrastructure in the West Region to sustain the economic development of the area and help increase the competitiveness of local firms, policy makers must address the weakness of the RTDI ecosystem, and leverage existing strengths. In this context, this section summarizes the region-specific opportunities and challenges discussed so far and outlines a number of policy recommendations which can be implemented at the regional level.

Rather than building new infrastructure to host startup companies, emphasis should be made on developing high value added services in existing infrastructure facilities in the region. Institutionalized mentorship schemes, sponsored networking and training programs may be considered among such activities.

Mentorship and training can achieve the goal of turning ideas into businesses. Innovators, who are potential entrepreneurs, are very good in terms of technical training, but they are not able to apply their ideas in practice. These individuals need to establish a company, consult with legal advisers who will guide them in approaching investors, and pitch their ideas to these investors. An incubator, in its true sense, should have the objective to turn the ideas into viable companies, not necessarily by providing funding, but at least by preparing the company for investment.

An immediate sectoral application of an incubation facility with institutionalized training, mentoring and networking functions can be in the ICT sector, since there is an existing community in place for supporting startups in this field. There are already well established entrepreneurs that grew from the UBIT incubator, whose directors may consider mentoring activities. Local angel investors could also be considered as potential mentors. The West Region is capable of equipping university students with good technical skills, competitive at the level of world best practices. In order to complement this technical skill with practical experience in modern laboratories abroad, the region can consider scholarship programs designed to send students for postgraduate study or internships abroad, with the conditionality of returning to a home institution upon completion of their studies.

Local financiers of innovation expressed interest in establishing a seed fund to invest in regional innovative activity. This initiative may be coupled with regional resources to generate a fund-of-funds structure which can be designed to re-invest part of the proceeds from successful projects.

The research undertaken at knowledge generating institutions, predominantly the RDIs, does not seem to be marketable, nor does it meet the demands of the private sector. The region should consider ways of consolidating the existing RDI system and increase the quality of research in the remaining institutes. The ongoing nation-wide mechanism of privatizing some of the RDIs is a good start, but the processes have been slow. Channeling of funds away from basic research and towards more the "innovation" side will be beneficial.

Investments in innovation are by nature risky and academics are not highly knowledgeable about the market's pricing for the risks involved in marketing the products. In most cases, firms do not perceive these institutions as capable of meeting their knowledge needs, and hence offer very low prices for academic research.

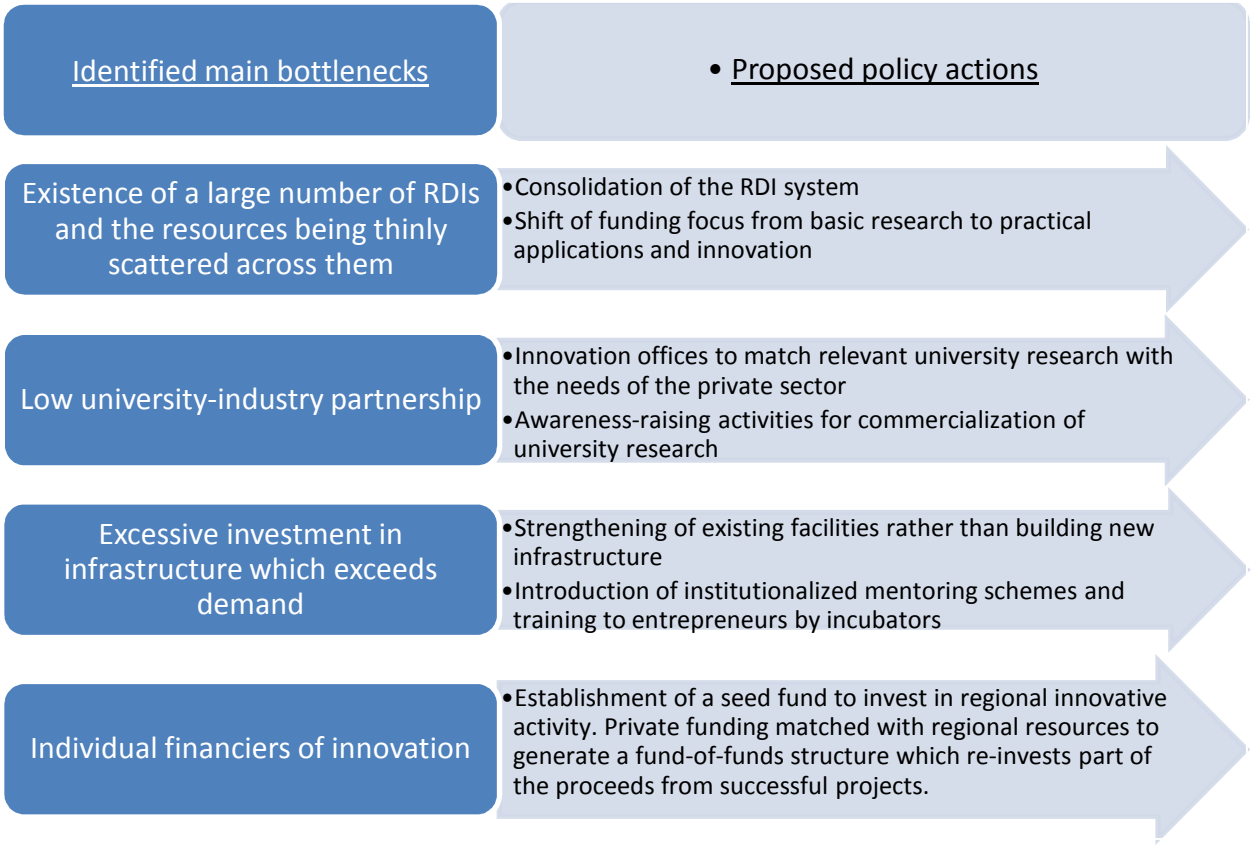
To fulfill the target of intensifying private sector's collaboration with the research institutions (universities and RDIs), the region may benefit from carefully designed innovation offices. Technology transfer may take the form of a licensing agreement between the academic researcher and a private firm, or a spinoff company established with participation of the main scientist involved in the project. Targeted innovation offices, either in-house within the universities or sector-specific for the key economic activities may be useful in carrying academics' ideas to the market. The functions of such

offices should be carefully designed, with caution to refrain from creating yet another layer in the bureaucracy, additional paperwork and delays for the researchers. The sole function of a targeted innovation office should be to facilitate the commercialization of the academic research, carrying applied researchers' ideas to the market and also promoting applied research within the universities and RDIs.

In terms of alleviating the burden of acquiring intellectual property protection for inventions, co-financing of patent applications can be a feasible means of support in the light industry, construction and energy efficiency sectors, where relevant RDIs have reported to have made some attempts at protecting the intellectual property generated within the institute, but have been unable to cover the full costs of the patent application.

The main bottlenecks to the development of the RTDI system in the West Region which were identified as part of this assessment are summarized below, along with a number of proposed policy recommendations to address these key challenges.

Figure 13- Recommendations for the RTDI ecosystem



4. Bottlenecks for Development of a Knowledge-Driven Economy: a Sector Level Analysis

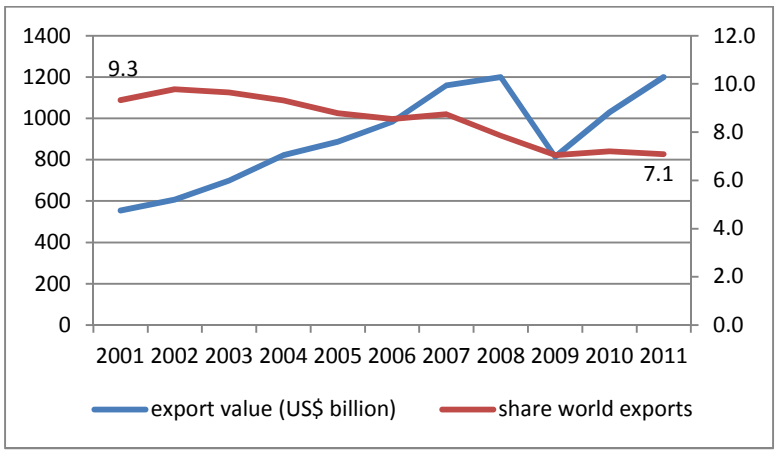
The idea behind RIS3 is promoting a larger contribution of knowledge and innovation to economic growth while building on existing or new areas of comparative advantage. Investing in R&D and technology would facilitate increasing the knowledge content in products/services provided and upgrading to higher value added activities. This is the only way to prevent the current comparative advantages of the West Region being solely driven by low costs of production.. This chapter provides an evaluation at the sector-level which identifies the comparative advantages as well as the main bottlenecks to growth in the six target industries that constitute the focus of the current analysis.

4.1. Automotive Sector

4.1.1. Sectoral overview, comparative advantages and challenges

The worldwide market for the auto sector has been expanding in the past decade. The world's auto exports doubled between 2001 and 2008 and experienced one of the most steep declines (-32.2% in 2009) in the aftermath of the global financial crisis. The sector rebounded in 2010 and 2011 and grew at annual growth rates of 26.4% and 16.5%, respectively, but only managed to reach the same exported value in 2011 as it did before the crisis in 2008. Even before the crisis the auto sector was losing importance in the world export market as its share of total exports declined from 9.3% in 2001 to 7.1% in 2011.

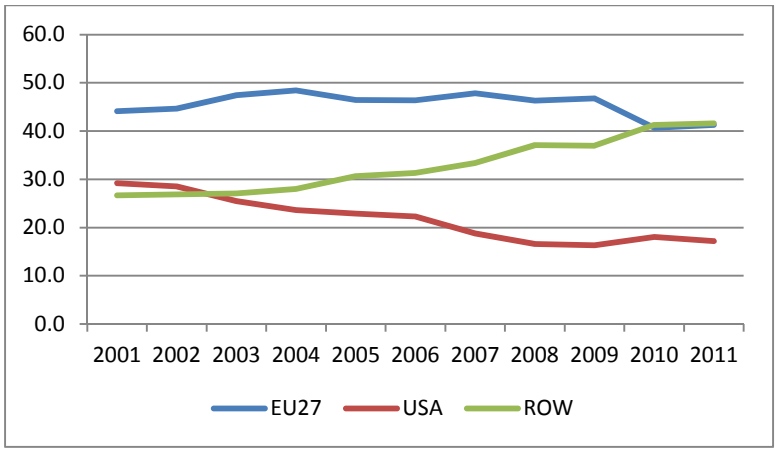
Figure 14 -Automotive sector: export value and share of total world exports



Source: World Bank staff calculation using UN-COMTRADE database

The EU-27 and the United States are the main import destinations for auto products and account for 41.3% and 17.2% of the world's imports in 2011, respectively. The importance of the United States as a main export destination declined over the last decade by more than ten percentage points as it accounted for 29.9% of world imports in 2001 but only for 17.2% in 2011. EU-27 slightly decreased its participation in the sector's imports from 44.1% in 2001 to 41.3% in 2011. Other countries became more important destinations for auto exports as their share of world's imports increased from 26.7% to 41.6% between 2001 and 2011.

Figure 15 -Share of world's imports of auto products



Source: World Bank staff calculation using UN-COMTRADE database

Since mid 2000's automotive sector took over the dominance of economic activity in the West Region from the textile industry.[18] The World Bank report on "Territorial Assessment: Profile, Performance, and Drivers of Growth" have shown that the auto cluster is the most prominent in employment and revenue for the region. It employs close to 15 percent of the employment (around 56,000 employees). This is also the highest employment level of the sector across Romania followed by South-Muntenia region. In output terms, the sector is responsible for 18% of the total turnover in the West Region. Well known as a mature activity, the automotive sector had, in 2010, almost 35% (81.6%) of its firms with at least 10(6) years old (Table 3).

Between 2008 and 2010, the sector alone was the major source of growth in employment and turnover for the region, and it is actually the only sector among agro-food, ICT, textile, and tourism that had positive employment and turnover growth (Table 2).

Table 2- Performance of selected clusters in the West Region (annual % growth rate, 2008-2010)

Sector/Cluster	Employment	Turnover
Agro-Food	-4.3	0.7
Auto	9.2	13.1
ICT	-7.7	-11.5
Rest	-10.1	-5.2
Textiles	-9.9	5.5
Tourism	-13.9	-17.9
Construction	-23.1	-12.2

Source: World Bank staff calculation based on SBS data

Table 3- Size and age composition of automotive firms in the West region, 2010 (%. of firms)

	Size		
Age	**Big(>=250)**	**Medium (50-249)**	**Small (1-49)**
1-5	1.6%	4.8%	12.0%
6-10	7.2%	11.2%	28.4%
+10	3.6%	11.6%	19.6%

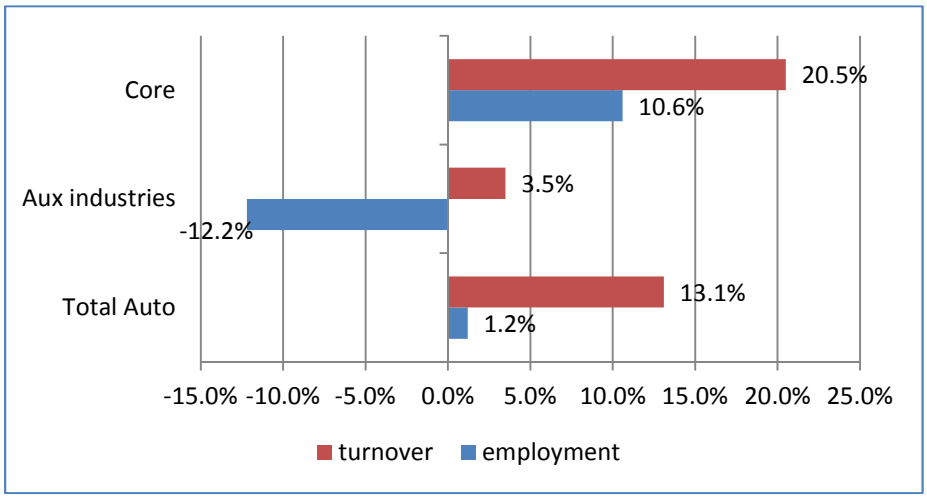
Source: World Bank staff calculation based on SBS data

The exceptional performance of the automotive sector is not uniform (Figure 16). It masks important differences that exist between the "core" of the auto sector industry (mainly parts and components manufacturers linked to export markets) and firms in the auxiliary industries. The former experienced double digit growth in terms of both turnover (20.5%) and employment (10.6%), while the

[18] Annex 1 presents a detailed definition of sector clusters.

auxiliary industries recorded a more modest growth of 3.5% in terms of output and a decline of 12.2% in terms of employment.[19]

Figure 16- Performance of the auto sector cluster in the West region (annual % growth rate, 2008-2010)



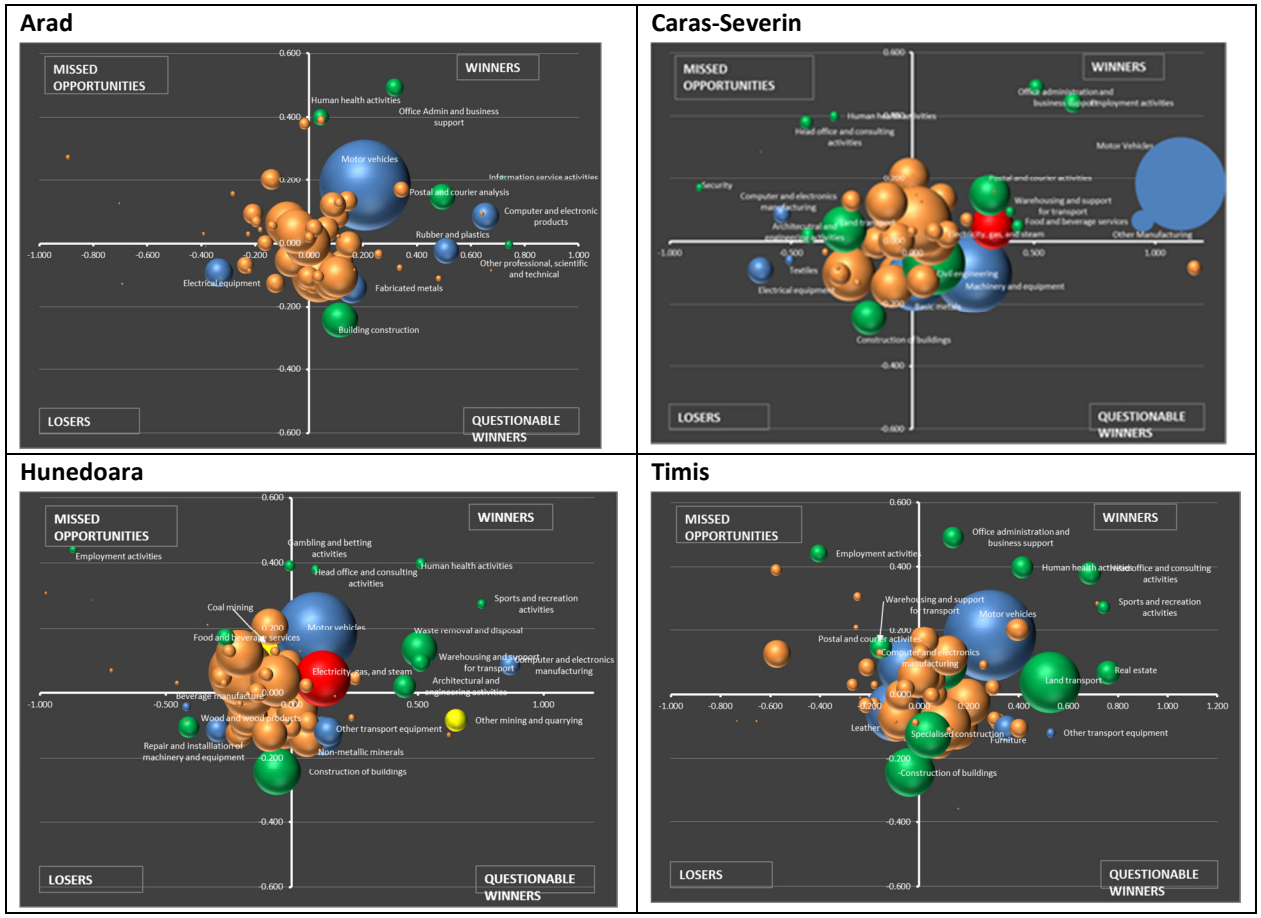
Source: World Bank staff calculation based on SBS data

The auto sector is among the top five sectors in terms of revenue and employment generation in almost each county of the region. In a complementing report of this project a *shift-share growth decomposition* analysis is presented which looks at the relative (employment) growth rate of a sector in a particular region with respect to the national economy (see figure below).[20] The sector is the most prominent one in the region; it grew strongly at the national level, but even more rapidly in every one of the counties of the West Region most notably in Caras-Severin then in Timis and Arad. This finding is noteworthy that the motor vehicles sector is among the leading areas of specialization in all counties, then suggesting that investments that catalyzed growth in Timis and Arad are spreading to some extent to other parts of the region.

[19] See the World Bank report "Competitiveness of West Romania Firms: Diagnostics, Challenges, and Opportunities"

[20] See the World Bank report "Economic Geography Assessment: Territorial Development Challenges in the West Region" .

Figure 17 - Shift-share growth decomposition for West Region counties - employment based (2008-2010)

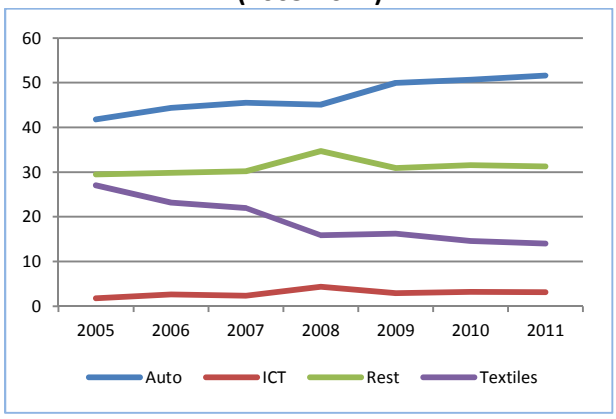


Source: World Bank staff calculation based on SBS data

Note: bubble size reflects 2010 sectoral employment in county; color reflects broad sector (yellow=primary; blue=manufacturing; red=utilities; green=services; orange=sectors not labeled in this figure); Note that in the figures for Caras-Severin, the bubble representing "motor vehicles" and "other manufacturing" actually show up much further along the x-axis, but the axis has been truncated to allow the other sectors to be viewed more easily.

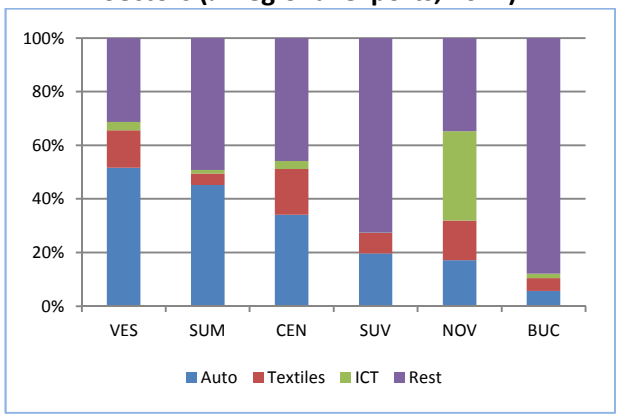
The importance of the auto sector is probably the most recognizable characteristic of the West Region as the sector accounted for 51.6% of total export value in 2011. Traditionally, the auto and textiles/footwear sectors represented the bulk of exports in the West Region, although both sectors had different trends: the former is becoming increasingly important as it went from representing 41.8% to 51.6% of total exports between 2005 and 2011 while the relative importance of the latter declined from 27% to 14% in total exports during the same period. Figure 19 shows that the impressive performance of the West Region's exports in the auto sector is not replicated by the automotive sector in comparator regions, with the possible exception of the Centre and South Muntenia regions - the only among comparators in which the auto sector represents more than 20% of exports.

Figure 18 - West Region: Exports by Sectors (2005-2011)



Source: World Bank staff calculations based on SBS and customs data

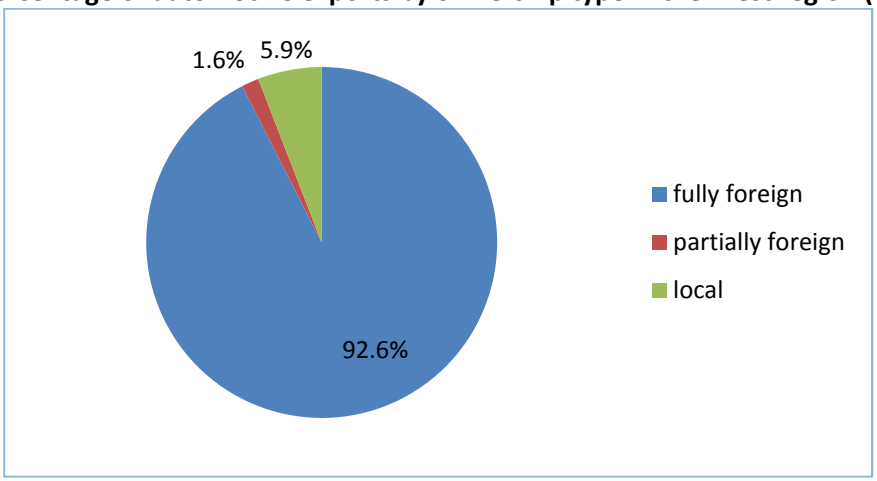
Figure 19 - Regional Composition of Exports by Sectors (% regional exports, 2011)



Source: World Bank staff calculations based on SBS and customs data

The degree of dominance of fully foreign-owned firms in exports flows is another important feature of the automotive sector in the West Region; fully foreign owned firms accounted for 92.6% of exports in the auto sector in 2011, a high level when compared to other top exporting activities (Figure 20). It is also worth noting that, especially in the auto sector, the importance of fully foreign-owned firms in total exports has increased over time to the detriment of partially foreign-owned firms. This is a relevant issue because it suggests reduced opportunities for partnerships and joint-ventures between foreign and domestic firms that could generate productivity spillovers and opportunities for transferring technology and skills to the local economy.

Figure 20 - Percentage of automotive exports by ownership type in the West region (2010)



Source: World Bank staff calculations based on SBS data

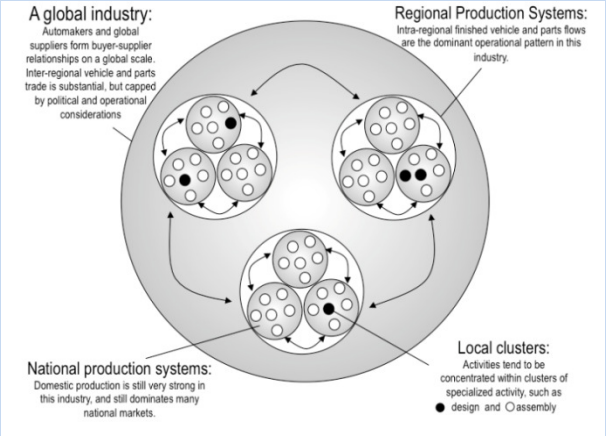
The increasing importance of foreign owned firms in the auto sector in the West region is strongly linked to the value chain participation (see Box 3). Due to its location and traditional links to Western Europe, the region has always been attractive to foreign investors. As a result, when Romania began the process of accession to the European Union, the West benefited significantly from the rush of foreign investment into the country. Component suppliers linked to Germany's automotive sector, in particular, made heavy investments in the West during the early part of the 2000s. This was based

primarily on a simple strategy of leveraging the wage advantages of Romania while remaining as close as possible to Germany and to other parts of the sector based in Central Europe.

Box 3– The automotive global value chain

The automotive global value chain is typically structured in a two-level format where large automotive manufacturers (OEM) are positioned on top of the pyramid as lead firms responsible for design, branding, and final assembly. The second level of the structure is constituted by first-tier suppliers that produce complete sub-systems by cooperating with a large network of lower (second and third) tier suppliers and subcontractors. Car assemblers and first tier suppliers tend to develop very close relationships, to ensure compliance with agreements, high standards of production and timely delivery of such complex parts and subsystems (Sturgeon and Florida, 2004). Overall, a relevant feature of the operational pattern in the auto industry is the nested geographic and organizational structure of the industry in which the global dimension coexists with regional production system, national production systems and clusters of specialized activities (see figure below).

Figure 21 - Nested geographic and organizational structure of the automotive industry



Source: Van Bisenbroek and Sturgeon (2011)

In this regard, the functioning of global value chains for the auto sector partly explains the nature of the region's export growth decomposition into intensive and extensive margin.[21] The large dominance of the automotive sector in the region's export basket is somewhat the reason why the export growth has been essentially dominated by an intensive margin. The World Bank report on "Trade Outcomes Assessment" shown that three quarters of total export growth of the region in the period 2005-2011 originated from firms choosing conservative export strategies both in terms of markets served and products offered in each market – i.e. firms which increased the overall value of their exports to markets where they were already going with products they were already exporting there.

Three main particular features of the automotive sector lie behind this result. First, at the firm level, the close relationships established between Original Equipment Manufacturers (OEMs) and first-tier suppliers, based on a system of confidence and trust, means that it is difficult for new firms to enter the market for auto parts and components. The fact that the first-tier suppliers with activities in the West Region are big multi-national corporations (MNCs) with global reach and operations in all major

[21] Export growth can come from four main components. First, increased exports of the same products, by the same firms to the same markets – this is known as the "intensive margin" of trade; second, existing exporters may introduce new products; third, existing firms may enter new markets; and fourth there may be firms entering export markets for the first time – these last three together are known as the "extensive margin" of trade.

centers of auto assembly in the world[22] means that successful entry into this field is limited to other MNCs that are able to compete in this environment. Second, at the product level, lead firms try to engage first-tier suppliers in the design stage in order to reduce frictions and problems that could arise during the manufacturing process. Because the design and development of a new product could take up to 5 years in the auto industry, and the time and resources involved in this relationship are substantial, usually only one first-tier supplier becomes responsible for supplying a particular component for a new auto line. Because these contracts for specific parts engage the parties for long periods of time, and because first-tier suppliers tend to locate plants with similar activities in geographical clusters, the bulk of export sales come from few products only. Additionally, some first-tier suppliers specialize in particular sub-components and/or specific parts (wire harnesses, steering wheels, dashboards, etc) which put limits to the range of products from which export sales could materialize. Finally, at the market level, because final assembly is also organized in a very distinctive fashion resulting in a geographical pattern of very specialized assembly plants - for instance, the Volkswagen Passat is only assembled in a plant in Emden, Germany and the Audi TT in a sole plant in Gyor, Hungary– and first-tier suppliers products are usually designed and engineered for one specific line as already explained, the geographical reach of auto parts/components exports is inherently limited.

Overall, while it is clear that the region has many productive assets in the sector it is still evident that complementing these assets with targeted R&D and innovation policies to increase the local knowledge will help firms to maintain their competitiveness and develop sustainable growth strategies. In this regard, it can be said that **West Region has an apparent comparative advantage in focusing on auto sector**. Some of the reasons for this inference can be listed as follows.

- The sector has been gaining market share in the region steadily since the early 2000s. This evidence shows that the relevance of the sector for the region has been tested and there is continuing demand for the output produced in the region. An indication of this demand was the influx of foreign firms to the region. Also the sector's dominance and strong growth performance in each county of the region reflects appropriateness of the sector's production for the region.
- The geographic location of the region gives it a clear advantage over the rest of Romania through its close distance to EU market which provides an advantage over transportation costs. Moreover accession to EU has streamlined trade relationships between Romanian firms and the rest of the EU member countries through establishment of bilateral and multi-lateral trade agreements and larger involvement in global value chains of production.
- Human capital with skill sets that are suitable for the sector's needs has been expanding in the region. Although it is still below the intended levels, there have been significant improvements in this area.
- The region still provides relatively low labor costs for automotive activities which is a major contributor to attract foreign multi-national corporations. Average wages are 13% below the national average in the sector.[23]
- West Region is among the most developed regions in Romania (in terms of income per capita). With this development level and high human capital, West Region is in an advantageous position to focus on more knowledge embodied innovation and technological changes. The region has been improving its capacity to produce high value-added activities.

[22] Nine of the top ten exporters that dominate the auto sector in the West Region belong to the top 100 list of first-tier auto suppliers worldwide.

[23] See the World Bank report "Economic Geography Assessment: Territorial Development Challenges"

- Due to long years of interaction with the EU countries, business culture is more developed in West Region than many other regions in Romania as well as the neighboring countries who might become potential competitors in medium term.

Although the region has a comparative advantage in this sector, its sustainability is not guaranteed. There are certain challenges which, if not addressed, may cause the loss of existing comparative advantages.

First, low labor costs might become a burden in the medium term for the comparative advantage of the country – and also in the automotive sector - rather than an opportunity unless relevant policy actions are taken. In two automotive poles of the region, Timisoara and Arad, possibility of increases in wages can easily lead to more competitive pressure from other low-wage regions in Romania or neighboring countries like Serbia, Bulgaria, or Ukraine and cause the dominant foreign firms to move to these alternative destinations.

Second, looking at the revealed comparative advantage of the products exported from the region, medium-tech products come only at the 14th and 15th place of the ranking, with electrical machinery (HS 85) and vehicles (HS 87), where the top positions are filled with low skill, low sophistication products (see table below).

Table 4 - Evolution of Revealed Comparative Advantages in the West Region, 2005 and 2011

HS2	HS 2-digit sector	% total exports		RCA	
		2005	2011	2005	2011
64	Footwear, gaiters and the like; parts of such	9.8	6.6	13.6	9.9
40	Rubber and articles thereof.	6.4	9.3	6.2	7.1
59	Impregnated, coated, cover/laminated textile f	0	0.7	0.2	6.2
94	Furniture; bedding, mattress, matt support, cu	4.7	5.4	3.6	5
67	Prepr feathers & down; arti flower; articles h	0	0.1	0.9	4.4
1	Live animals	0.3	0.5	2.4	3.9
41	Raw hides and skins (other than furskins) and	0.3	0.6	1.1	3.6
61	Art of apparel & clothing access, knitted or c	9.4	3.5	7.6	3.1
5	Products of animal origin, nes or included.	0.1	0.1	1	2.6
58	Special woven fab; tufted tex fab; lace; tapes	0.2	0.1	1.9	2.5
65	Headgear and parts thereof.	0.2	0.1	3.8	2.5
44	Wood and articles of wood; wood charcoal.	2.1	1.7	2	2.3
85	Electrical mchy equip parts thereof; sound rec	33.9	28.9	2.4	2.3
87	Vehicles	8.9	16.3	1	2.3
69	Ceramic products.	0.6	0.5	1.9	2.2
62	Art of apparel & clothing access, not knitted/	6.3	2.4	4.3	2.1
42	Articles of leather; saddlery/harness; travel	0.8	0.7	2.2	1.8
57	Carpets and other textile floor coverings.	0	0.1	0	1.6
76	Aluminium and articles thereof.	0.2	1.4	0.2	1.5
83	Miscellaneous articles of base metal.	0.5	0.5	1.2	1.4

Source: World Bank staff calculations based on INS customs data

Third, the region's increasing participation in European value chain production has resulted in declines in the value added share of output in automotive sector which diminished from 30 to 23

percent between 2008 and 2010 (see Figure 40) which shows evidence about the weak links between the foreign and domestic firms in the sector. A number of factors contribute to this, including scale economies, the difficulty for small local suppliers to meet international quality standards, and the fact that many purchasing decisions at the foreign-owned firms are taken not in the West Region plant but at the corporate headquarters. In this regard, a related concern is that, where the value added contribution of a unit or location to overall output is low, it is less likely the business will be fully embedded in the local economy, particularly if it is foreign-owned. The concern is that such firms may be more likely to close or move out of the region.

Fourth, although exports of auto parts have increased over time, this growth has been on the intensive margin (same firms exporting more of the same products to the same markets). There is low contribution of new export destinations to export growth. Lack of market diversification poses risks on periods of economic uncertainties as was seen in the recent financial crisis.

4.1.2. Specialization opportunities

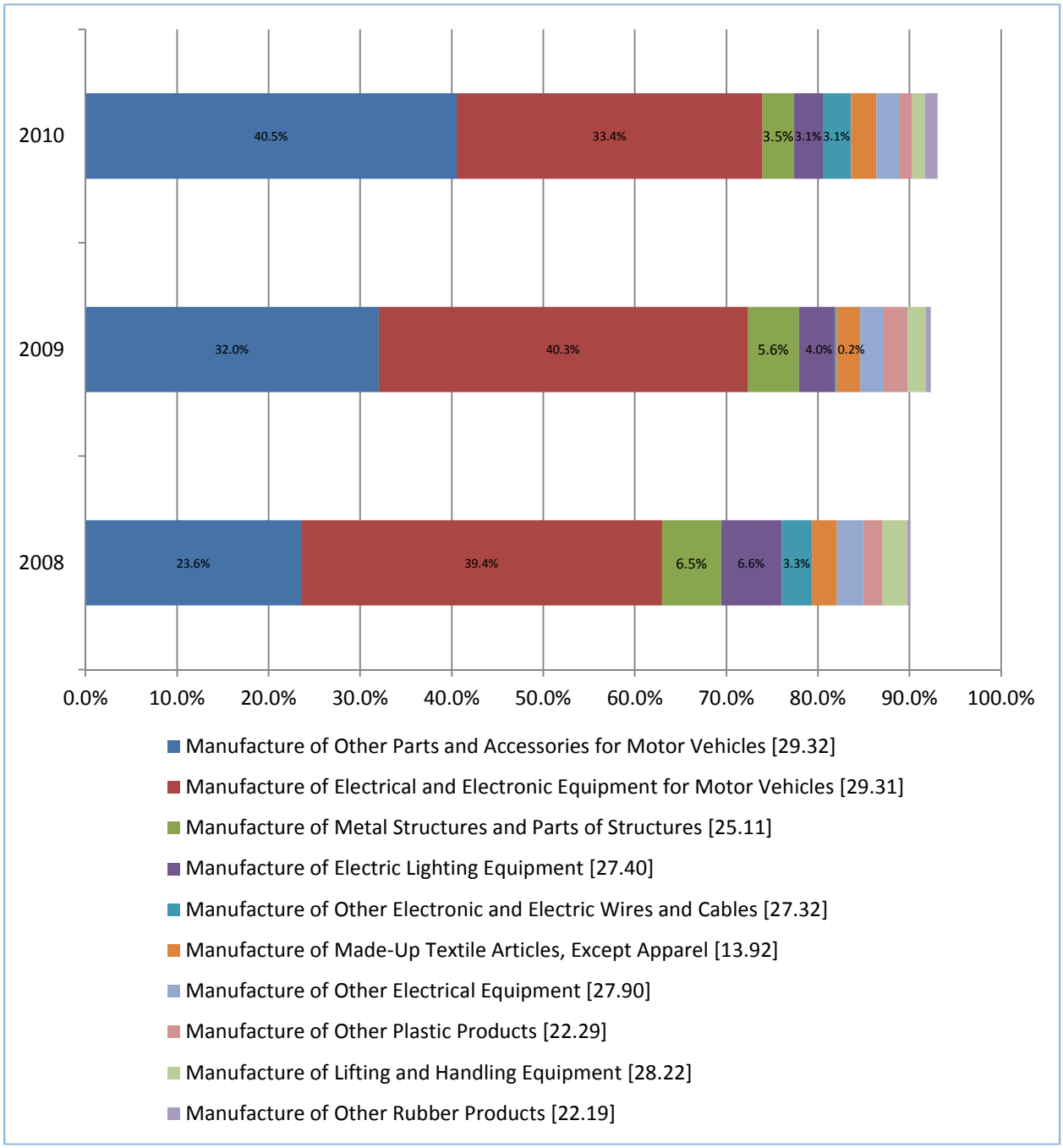
The need to increase the amount of value added to output in the auto sector has emerged as one of the key issues for the growth sustainability of the auto sector in the West region. Meeting this goal is in principle difficult given the organization structure of the automotive value chain, and particularly due to the way the auto firms in the region are linked to this chain. As already stressed, with a strong presence of foreign owned first-tier suppliers in the region, the most part of production decisions are not taken locally. That said, while it is true that little space is left to make choices at local level, it is also true that the region can play a role in providing the right expertise and support to production. Even in this scenario, it is important to identify opportunities for further specialization in the sector that can increase the value added generation. Once this is identified, the right mix of policies can help strengthening the region's capability to provide solid and integrated support for the auto activities in such a way to reinforce the region's position in the international value chain.

The analysis of the basic firm level (outcome) performance at subsector level can provide useful information to identify high-growth activities and to point the existing potential in terms of specialization niches for the region in the near future.

In this regard, it is worth emphasizing that this "identification exercise" is essentially evidence based and simply reflects the main trends emerging from the (INS) data analysis; it does not involve the ad-hoc selection of particular activities based on any exogenous (and potentially biased) criteria. Therefore, the identification of specialization niches must be caveated by the available time frame: as the INS data covers 2008-2010 time horizon, the analysis reflects the immediate post crisis scenario and, for this reason, should be cautiously interpreted.

The firm level information (available from INS database) allows the identification of the top 10 sectors in terms of value added in 2010 (Figure 22). Two main messages emerge from these numbers. First, data shows that the value added share owned by the top 10 (NACE 4 digit) activities has increased since 2008, from 90.1% to 93.1% of the all value added in the sector. Second, and more important, value added generation by the whole auto sector in the West region is becoming increasingly concentrated towards two main activities: Manufacture of Other Parts and Accessories for Motor Vehicles and Manufacture of Electrical and Electronic Equipment for Motor Vehicles. These two activities account for almost 75% of the total value added generated in the sector (see figure below).

Figure 22 -Value added share by top 10 activities (NACE 4 digit) in automotive sector: 2008-2010



Source: World Bank staff calculation based on SBS data

While these numbers are important, they don't provide enough information to point the emerging specialization niches within the whole auto sector. The analysis of (annual) productivity growth - as the ultimate proxy of the sub sector excellence - combined with figures for employment, value added and turnover can then work as useful inputs to identify high growing activities. Table 5 below displays the annual growth rates – in the 2008-2010 period - of all these outcome variables for all the top 10 NACE4 digit activities.

Table 5- Basic outcome performance for top 10 activities (NACE 4 digit) in automotive sector: 2008-2010

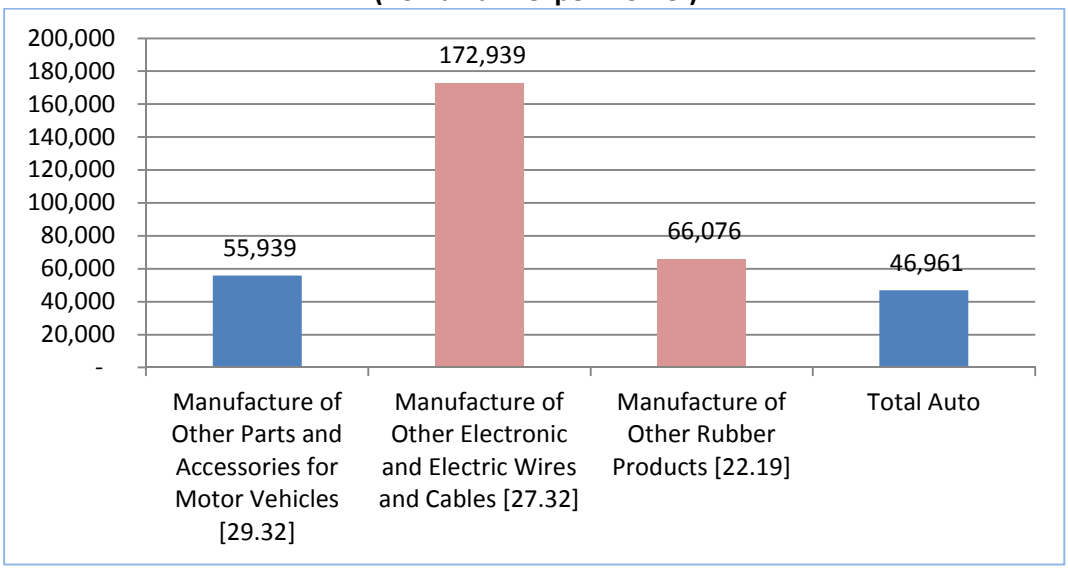
	Annual growth rate (2008-10)			
nace4_description	**Prod**	**VA**	**Empl**	**Turnover**
Manufacture of Other Parts and Accessories for Motor Vehicles [29.32]	15.5%	25.8%	8.9%	22.7%
Manufacture of Electrical and Electronic Equipment for Motor Vehicles [29.31]	-14.8%	-0.6%	16.7%	29.4%
Manufacture of Metal Structures and Parts of Structures [25.11]	-3.4%	-14.7%	-11.8%	-10.2%
Manufacture of Electric Lighting Equipment [27.40]	46.4%	-18.1%	-44.0%	-5.9%
Manufacture of Other Electronic and Electric Wires and Cables [27.32]	19.1%	2.5%	-14.0%	22.6%
Manufacture of Made-Up Textile Articles, Except Apparel [13.92]	15.2%	5.8%	-8.2%	-17.7%
Manufacture of Other Electrical Equipment [27.90]	-0.9%	-0.5%	0.5%	6.1%
Manufacture of Other Plastic Products [22.29]	-0.8%	-7.8%	-7.0%	-1.8%
Manufacture of Lifting and Handling Equipment [28.22]	-0.6%	-15.3%	-14.7%	-11.4%
Manufacture of Other Rubber Products [22.19]	33.2%	60.4%	20.4%	40.4%
Total Auto sector	2.4%			

Source: World Bank staff calculation based on SBS data.
Note: NACE 4 digit codes between brackets.

In principle, three activities emerge as real high growing activities over the 2008-2010 period. Manufacture of Other Parts and Accessories for Motor Vehicles, Manufacture of Other Electronic and Electric Wires and Cables, and Manufacture of Other Rubber Products have presented an annual productivity growth rate that is higher than the average for the whole auto sector and have simultaneously showed a positive performance for at least two of the remaining outcome variables under analysis (employment, value added and turnover). Manufacture of Other Parts and Accessories for Motor Vehicles shows a positive performance for all outcome measures under analysis which suggests that the activity is in fact the robust (and clear) driver of growth in the auto sector in the region. While this is not surprising, the other two activities present a more interesting picture. For Manufacture of Other Electronic and Electric Wires and Cables productivity growth rate has increased more than the overall sector and both value added and employment have presented a positive performance, despite employment shrinking. In this regard, this subsector presents a reasonable potential for growth as it accounted for only 3.1% of the overall value added in the sector in 2010. For Manufacture of Other Rubber Products, all outcome measures have presented a positive performance (and always above the average sector level) and responded for only 1.4% of the value added in the whole auto sector, suggesting huge growth potential for the future.

Overall, to the extent that Manufacture of Other Parts and Accessories for Motor Vehicles is already a strong activity within the auto sector in the region, the other two subsectors could be seen as potential areas for further development, particularly if the capacity to generate value added is taken into account. Figure 23 displays the 2010 average labor productivity for each one of the highlighted NACE 4 digit activities; numbers suggest that both Manufacture of Other Electronic and Electric Wires and Cables, and Manufacture of Other Rubber Products have higher value added per employee than the overall auto sector and also higher than the Manufacture of Other Parts and Accessories for Motor Vehicles, the main subsector within the auto cluster.

Figure 23 - Average labor productivity for selected NACE 4 digit sectors within automotive sector: 2010 (Romanian Lei per worker)



Source: World Bank staff calculation based on SBS data

In this regard, it is worth mentioning the huge potential these two activities have also in terms of exports, particularly when product/technological links with already exported products is taken into account. The Manufacture of Other Rubber Products is linked with production of new pneumatic tyres of rubber which is among the top 5 exported products by the region in 2011 (accounting for 7% of the total exported value). The Manufacture of Other Electronic and Electric Wires and Cables it is strongly linked to the successful production of modern electrical and computer systems in cars as evidenced by rising exports of Electric conductors (HS 854449 and HS 85441), numerical control panels (HS 853710), optical devices, appliances and instruments (HS 901380), and measuring and checking instruments (HS 903180). This said, the Manufacture of Other Electronic and Electric Wires and Cables deserves particular attention not only because of its huge labor productivity but also because it can constitute a real opportunity for the region to upgrade to higher value added activities while connecting with the production of modern car systems, a niche that has been presenting strong and growing demand worldwide.

4.1.3. R&D activity, linkages with RTDI supply and connections with global networks: how does it relate to specialization in the sector?

While it is clear that the auto sector in the West region is connected to the global value chain, there is less concrete evidence about how this connection specifically works. The use of the methodology and classification developed by Taymaz et al. (2011) - which assigns exports goods (categorized at the 4-digit ISIC code) to one of four stages of production, namely: final products; main inputs/parts; standard inputs; raw materials[24] - provides a useful way to assess the connection between

[24] The original classification includes an extra segment, machinery and equipment, that is excluded for the purposes of the analysis due to its small relevance for the region. The classification distinguishes four stages of production for five industries (motor vehicles, textiles and apparel, food, TV, and machinery) but only the classifications for the first three industries are relevant for the West Region and thus used in this analysis. The classification identifies the final products, its main inputs and parts, other more standard inputs, and the raw

local clusters and global value chains. The West Region's pattern of specialization in the auto value chain is confirmed by Table 6. Unsurprisingly, almost all exports came from standard auto parts (98.3% in 2011) and a very small share came from final products (1.5%) and main parts of components (0.1%). The West Region does not record any significant exports of raw materials traditionally used by the auto value chain. From a dynamic point of view, the share of standard parts in auto exports has changed little between 2005 and 2011 and no other segment seems to be gaining enough relative importance to threaten the dominance of standard parts.

Table 6 - How the West region is connected to the auto value chain: exports in the Auto Sector by stage of production (% sector exports in 2011)

Value chain stage/segment	2005	2006	2007	2008	2009	2010	2011
Final products	0.1	0.1	0.8	1.3	2.7	1.8	1.5
Main parts and components	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Raw Material	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Standard parts	99.9	99.8	99.2	98.7	97.3	98.2	98.3

Source: World Bank staff elaboration based on INS customs level data

Table 7 presents the top five exported products per value chain segment in the West Region in 2011. Steering wheels, tires, other parts, and safety belts, dominate the exports of main parts of the automotive sector. Generally, exports in each stage of the automotive value chain are very concentrated as the top five export products represent more than 80% of exports in all segments besides Final Products. Additionally, the Main parts and components and Raw materials segments are so marginal that the region only exports three and two products, respectively (defined at the HS 6-digit level), respectively. The contributions of each segment of the value chain in the auto sector are extremely skewed toward standard parts, which account for almost all of the exports in the auto value chain. Final auto products are the second most important segment of the auto export chain, with less than 2% of total exports. No product outside standard parts accounted for more than one percent of auto exports in 2011.

materials needed for the production of the final good. The advantage of the Taymaz et al (2011) classification is that it carefully assigns activities and products to production stages, based on engineering considerations. There are at least two downsides. Being a classification that only covers goods exports, it does not identify the services segments of value chains, such as R&D, design, commercialization, distribution, marketing/branding, logistics, and after-sales services, precisely the segments that allow for functional upgrading. Second, being reliant on export data, it does not account for the domestic dimension of value chains thereby providing only a partial overview of the situation.

Table 7: Top exported products in the automotive value chain, by stage of production

Stage/Segment	HS code	Product	% segment exports	% auto exports	rank
Final products	870332	Automobiles with diesel engine displacing more	13.9	0.2	1
Final products	870421	Diesel powered trucks with a GVW not exceeding	13.7	0.2	2
Final products	870322	Automobiles with reciprocating piston engine di	11.9	0.2	3
Final products	870323	Automobiles with reciprocating piston engine di	11.5	0.2	4
Final products	870423	Diesel powered trucks with a GVW exceeding twen	10.5	0.2	5
Main parts and components	870600	Chassis fitted with engines for the vehicles of	99.1	0.1	1
Main parts and components	870790	Bodies for tractors, buses, trucks and special	0.9	0.0	2
Main parts and components	840820	Engines, diesel, for the vehicles of Chapter 87	0.0	0.0	3
Raw Material	721924	Flat rlld prod, stainless steel, hr, nic, >600m	98.0	0.0	1
Raw Material	721923	Flat rlld prod, stainless steel, hr, nic, >600m	2.0	0.0	2
Standard parts	870894	Steering wheels, steering columns and steering	30.7	30.2	1
Standard parts	401110	New pneumatic tyres, of rubber of a kind used o	29.5	29.0	2
Standard parts	870899	Motor vehicle parts nes	11.7	11.5	3
Standard parts	870829	Parts and accessories of bodies nes for motor v	10.7	10.5	4
Standard parts	870821	Safety seat belts for motor vehicles	4.3	4.2	5

Source: World Bank staff elaboration based on INS customs level data

The fact that the organization and functioning of the auto sector in the region is tightly linked with the global value chain – particularly through the production and exports of standard auto parts -has consequences over the R&D activity carried out locally. The interviews with local firms have helped identify the main issues that lie behind the ability to develop R&D activities in the region.

R&D activity in the sector tends to be done outside the region, often in the headquarters of foreign owned companies (OEM and first-tier suppliers) or in collaboration with top universities worldwide. In this regard, the research needs of the large companies are met in house most of the time, without much interaction with the research universities in the region. These large players believe that the universities could in principle provide some research support, but they do not have the resources, such as high class laboratories and advanced equipment.

A crucial step forward to increase the R&D investments in the region is establishment of well-equipped independent laboratory infrastructure. These lab facilities enable capacity in the region to produce and test prototypes which is pivotal for local suppliers to become part of global value chains. Furthermore, the labs would help attain high quality standards required by OEM and suppliers which usually a concern and the main reason for which most of the machines and equipment used in production are acquired from foreign suppliers. Labs would help the accumulation of local know-how in the automotive sector in the region and possibly create spillovers to local manufacturers.

Quite often lack of sufficient lab infrastructure inhibits completely or creates huge delays in testing the quality and validity of new products, processes, and designs which are crucial in auto sector. Long wait times increase the opportunity costs for local firms to engage business relationships with large MNCs. Only a few large firms like Continental have access to testing labs in the West region which are not accessible to outside firms. Due to lack of better alternatives some of local firms send their products to Germany or Hungary to be tested. Labs with international standards in the region will attract the

attention of OEMs and first-tier suppliers and provide them further incentives to use local supplies. Such research and testing labs cannot be all financed privately as they would be beyond the reach of local SMEs. Public private partnerships would be vital in building and operating these expensive infrastructures.

The sector would also benefit greatly from initiatives that support greater integration of local suppliers to MNCs. A major step towards achieving better integration of local suppliers with global production networks is improving the quality level of production. Establishments of relevant research labs as discussed above would alleviate this problem and help to restore the confidence in MNCs to increase the scale of collaborations with local suppliers. Through these linkages, local firms can benefit through transfer of technology and the creation of spillovers.

Local SMEs lack capacity to produce large volumes of output that MNCs need. First/second tier auto suppliers would prefer not to work with too many small suppliers due to coordination problems. Yet small firms cannot respond to large demands. Establishment of auto clusters that are well-connected with the production networks could significantly improve the output capacity of sector in the region especially by allowing many SMEs to cooperate in production and enable them to jointly handle large-scale orders.

A research organization with a high level of private sector connection is the National Institute for Research and Development in Electrochemistry and Condensed Matter (INCDEMC), which has collaborations with large companies, such as Continental, as well as with smaller companies. INCDEMC engages in joint projects with the private sector develop environmentally friendly solutions. Another active RDI with a strong relationship with the private sector is the National RDI for Welding and Material Testing. Both institutes find it difficult to reach out to the large number of small firms in the region that operate in the auto sector, despite the fact that they actively seek partners for joint projects. It may be advisable to catalyze the interaction between the RDI and the local private actors with research needs. Another difficulty in commercializing the research at these RDIs is the high cost of filing EPO patents. Both RDIs mentioned here have many Romanian patents, but since they engage in partnerships abroad, they would benefit from a support mechanism for their applications to file EPO patents.

4.1.4. An evaluation of the horizontal constraints that affect the sector

Access to external finance

Many local SMEs are extremely cautious and hesitant in scaling up their production or diversifying their product scope. This mainly depends on the uncertainties in auto market and high interest rates charged by local banks to purchase a new machine/adopt a new technology both of which diminish the aptitude for risk. This leads to a bi-modal distribution of firms in the sector where large firms get larger and small ones cannot grow.

Access to external bank financing is rather scarce in the region. West region has one of the lowest use of domestic credit in Romania (1.3% of total investments in 2010). They try to compensate this gap by using foreign credit through their connections with foreign suppliers or clients but it is also difficult to get (0.6% of investments in 2010). Heavy reliance on own resources makes it difficult to make productive investments. Some of the SMEs in the region have used EU funds for their productive investments. Accession to EU funds has been very helpful in alleviating the risks for new productive investments. However, application process needs to be streamlined. Most of the time, the firm needs to hire a consulting firm and the evaluation process last long.

Skills and training

Increasing human capital to work on design and development activities in the region is a major constraint. Timisoara is the only city where such capacity is available, yet it is limited. University graduates should be better trained on how to apply and experiment their theoretical knowledge. Firms usually have difficulties finding graduates to fulfill their needs and the skills obtained from the school do not go beyond theoretical knowledge. Lack of applied and technical skills is more likely to be expressed as a severe constraint by large, globally integrated MNCs or their subsidiaries than by local SMEs in the sector. This might be due to differences in the complexity of operations performed by each group.

In order to develop appropriate skill sets for young graduates, linkages between industry and universities must be improved. This can occur through public-private partnerships aimed at R&D collaborations on joint projects or by adjusting the school curriculum to respond to the industry needs. Currently such collaborations are only available for large companies like Siemens and Continental, which have programs and partnerships with local universities. These efforts must be scaled up and should encompass local firms including small and medium size enterprises.

Vocational training schools also need to be further improved in order to supply qualified technicians (specialized labor) for the sector. Lack of skilled workers who can operate mid and high-tech machines add additional burdens on firms and increase cost of production. Access to a larger pool of specialized labor force complemented with better guided young university graduates would strengthen the region's comparative advantages in this sector.

Local SMEs should be better prepared to integrate with the global auto production networks. These firms usually lack relevant business management skills, knowledge on quality standards/certificates, knowledge of new technologies and production know-how. Providing mentorship and training to improve their technical and business management skills, attain better efficiency, and understand the processes required to supply for MNCs or to export, and showing how these improvements can help them to become included in the global value chains, would promote their connection with the MNCs.

Transport infrastructure

Two main aspects of infrastructure stand out as major obstacles for sectoral development. Unstable flow of electricity and the unexpected outages affect businesses' operations and damage equipment. Considering the heavy reliance on high-tech machines in the sector, this is a serious concern and a major source of productivity loss.

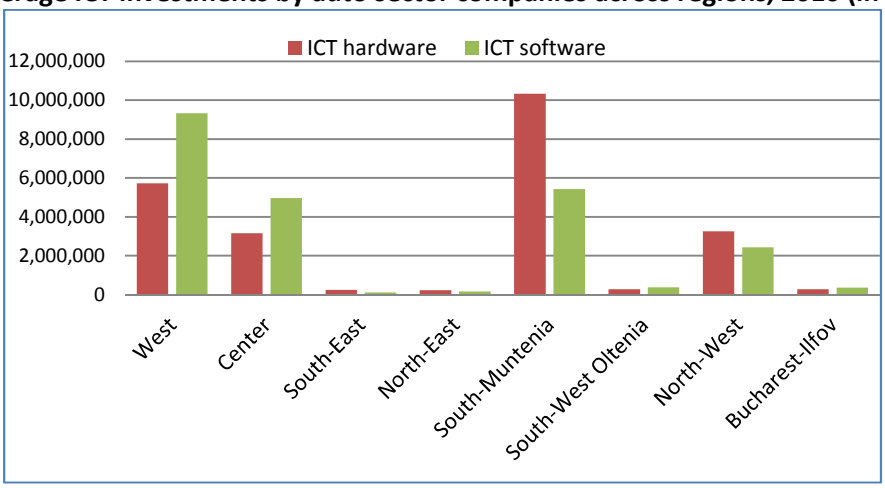
The second aspect of infrastructure that constrains firms is roads. The primary means of transportation in and out of the region are the roads and there are not sufficient high-ways to meet the needs of the economy. With better roads, the region could develop a dual system, with firms moving their labor-intensive production activities to backward counties of the region and keep their knowledge intensive activities such as design and development in centers like Timisoara and Arad. The lack of adequate infrastructure also affects the daily transportation of workers to the production facilities. Many companies in the region have to finance buses for employees, due to a shortage of roads or public transportation options in the vicinity of the plants. Moreover, interviews with automotive companies indicate that the acquisition of transport licenses can be problematic.

4.1.4. Prospects for sectoral development and considerations for policy actions

Keeping labor costs low is not a sustainable development strategy for the sector to remain globally competitive. Policies must be developed to increase economic activity in areas where more knowledge and technology is produced. The large number and diverse set of inputs used for production in auto sector enable it to generate cross-sectoral linkages and help development of various activities in the region including engineering, metals, electronics, and textile. Beyond the core motor vehicles subsector, the automotive 'non-core' activities contributes close to 14,000 direct manufacturing jobs, making the 'non-core' part of the automotive sector still larger than any other manufacturing activity in the region.

In 2010, manufacture of electrical and electronic equipment for motor vehicles has the second highest value added share (33.4%) in auto sector in the region. It also has by far the highest employment level in the region (40.5%). This is encouraging for the future of the sector as production of electrical and electronic equipment involves high collaboration with ICT sector and value added in this sector is higher than other many other sub-sectors of auto production value chain.

Figure 24 – Average ICT investments by auto sector companies across regions, 2010 (in Romanian Lei)



Source: World Bank staff elaboration based on INS dat

Firms in auto sector in the West Region invest high amounts in ICT (Figure 24). Products like electric conductors, numerical control panels, optical devices, and measuring and checking instruments which are traditionally classified as part of the electronics sector, are largely manufactured by big multinational auto firms in the region. These products form part of modern electrical and computer systems in cars. They have been among the most dynamic products over the past six years. The rise of exports of these products might spearhead the evolution of the auto sector from labor-intensive products like wire harnesses towards more sophisticated electronic products with higher value added.

After years of involvement in low value-added, high labor-intensive tasks, some large MNC (like Yazaki or Hella) have started to benefit from the local capacity and know-how accumulated over the past years and have begun to engage in design and development activities. These initiatives create great opportunities for knowledge spillovers to region. Timisoara and to some degree Arad have developed the know-how and capacity to be successful in these areas. Efforts to introduce new designs, products, processes and technologies must be scaled up and must be backed by supportive policy reforms. For the majority of the sector's output comparative advantage is generated by low unit costs of production rather than high value generation. Moving the labor-intensive production facilities from hubs like

Timisoara and Arad to towns in lagging counties with lower labor costs can contribute to the development of these areas while helping Timisoara and Arad become knowledge hubs. Moreover, higher contribution of lagging counties to the production process can indicate better sufficiency to support large scale investments in auto sector.

With the right policy guidance the region has the potential to develop a strong auto sector that can generate high value added in medium to long term. Whereas the firm-level data analysis has pointed to high growth subsectors (NACE 4 digit) within the auto sector in the region, the specific areas for policy intervention will focus primarily on actions that can enhance growth potential at the level of the sector as a whole. This is because interventions focused on subsectors at the NACE 4-digit level would inevitably benefit a very small number of firms. In this regard, it is worth emphasizing that policy makers must avoid using a "picking winners" approach since the role of a smart specialization strategy is to promote the role of the knowledge factor to economic growth, and to act as a flexible system that endorses iterative learning, but not to focus on specific economic activities.

The overarching challenge for the automotive sector in the region is then how to effectively promote knowledge spillovers (from the existing activities) and further technological diversification either towards higher value added activities, in general, or towards the identified specialization niches (Manufacture of Other Electronic and Electric Wires and Cables, and Manufacture of Other Rubber Products), in particular. Again, the role of the region in the global value chain of the auto sector is a key element (and constraint) since upgrading within automotive value chains require moving up a very hierarchical structure. In this regard, while diversification in these terms is difficult it is also feasible if the international investors are aware that the region can offer and better develop the expertise in the emerging specialization activities and integrated support to production. [25]

Under this context, the test the West region is confronted with in terms of upgrading to higher value added activities within the automotive sector are in various areas. Namely: widening the pool of labor and upgrading the skill offer; developing locally R&D and innovation activities so to help establish a cluster of sophisticated and value added activities in the region; and developing a wider base of local suppliers able to graduate to higher tier suppliers. This said, based on the discussion provided above there are four main areas of policy recommendations.

First the value added in production must increase by incorporating more knowledge and technology in production. Although there are many foreign MNCs in the region, the transfer of technology and knowledge to local firms is insufficient, mostly due to the nature of the tasks undertaken by local firms. Establishment of research institutes and labs will incentivize local firms to prepare prototypes, test their new designs, products and processes to be included in the global supply chain of MNCs. Once a firm becomes part of a supply chain the learning and spillovers are likely to be faster. The labs will also give opportunities for more frequent quality tests which will increase reliance of local producers.

A second policy recommendation would be developing appropriate applied and technical skill sets of young university graduates that can fulfill the demands of the auto sector. This could be achieved through public-private partnerships aimed at R&D collaborations and adjusting school curriculums to

[25] The case of Continental can be pointed as an emblematic example. The company purchased the existing Siemens VDO business in 2007, operates both manufacturing and R&D in the West Region. While production activities include substantial use of imported inputs, they also require significant technology and rely on a highly skilled workforce in the production of a range of electronics, including instrument and cluster display systems, airbag control units, and electronic parking brakes. In addition, Continental employs a large number of highly skilled researchers in its R&D center in Timisoara.

respond to industry needs. Training in vocational schools would also help to respond to the increasing need of skilled technicians. In addition to technical skills, development of entrepreneurial skills on business development, management, and financing would help local SMEs to be better connected with the global networks of the sector which fortunately have already many active players in the region. Encouraging entrepreneurial initiatives like investing in new machinery or technology, testing new products and processes, diversifying markets, trying new export destinations would all help creating a vibrant and competitive sector.

Third expanding and increasing the awareness of the auto clusters initiatives (like the Automotivest) would stimulate exchange of ideas, sharing of experiences and would help local producers become better and more connected with the large players. Lastly, reinforcing the cross sectorial links that already exist between automotive and ICT. In this regard, it is worth emphasizing the critical role the automotive sector plays, not only because of its dominant position in the region, but because it is traditionally a bridge across a number of sectors, which includes not only ICT but also engineering, metals, and electronics. The development of system solutions for automated production and business process are typical options for further collaboration between the sectors. The investment made by Siemens in the early 2000s and later over by Continental Automotive can be seen as an emblematic case in this respect.[26]

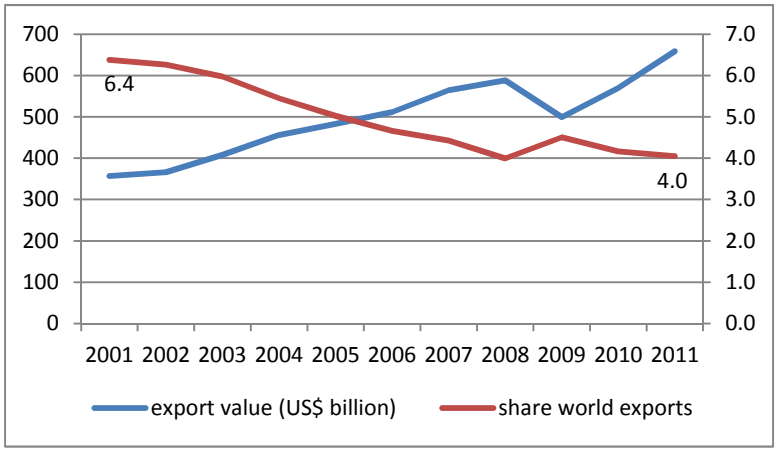
4.2. Textile Sector

4.2.1. Sectoral overview, comparative advantages and challenges

World exports of textiles – which encompasses manufacturing of textiles, wearing apparel and leather product - grew at an annualized growth rate of 6.3% between 2001 and 2011 which represented almost a two fold increase in export value over the last decade. Textile and apparel exports grew steadily between until 2008 before experienced a severe decline of 15.1% in 2009 as a result of the global financial crisis. The sector rebounded in 2010 and 2011 and grew at annual growth rates of 14.2% and 15.6%, respectively. However, despite expanding for most of the last decade, the textiles and apparel sector lost importance in the world export market as its share of total exports declined from 6.4% in 2001 to 4.0% in 2011.

[26] This investment in 2000 established an R&D center for automotive software and hardware, covering applications including software development and testing for a wide range of vehicle systems. This automotive investment can be seen as one of catalysts of the development of the ICT sector in West Romania. Not only did it put the region on the map for ICT, but it provided a base of skilled and trained programmers to future investors, as well as launching entrepreneurial start-ups. One foreign ICT firm in the sector noted that they chose to locate in Timisoara specifically to access the Continental labor force.

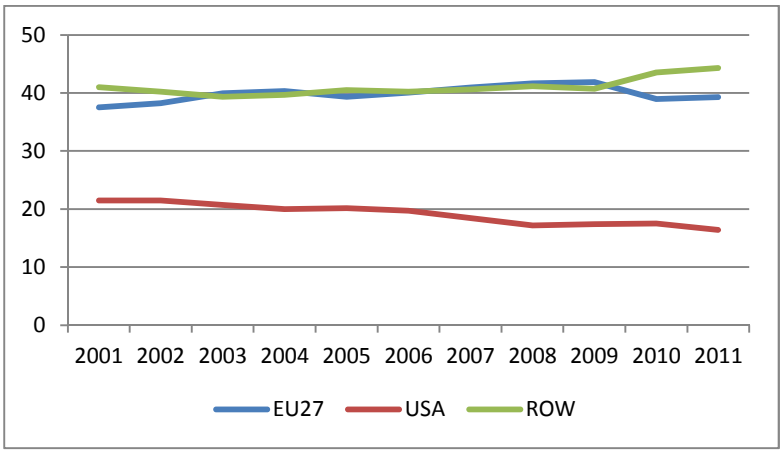
Figure 25 - Apparel/Textiles: export value and share of total world exports



Source: World Bank staff calculations using the UN-COMTRADE database

The EU-27 and the United States are the main import destinations for apparel and textiles products and account for 39.3% and 16.4% of the world's imports in 2011, respectively. The United States has lost some importance as a destination for apparel/textiles exports over the last decade as it accounted for 21.5% of total imports in 2001. The EU-27 slightly increased its participation in the sector's imports from 37.5% in 2001 to 39.3% in 2011. Other countries represent about 45% of apparel/textiles imports.

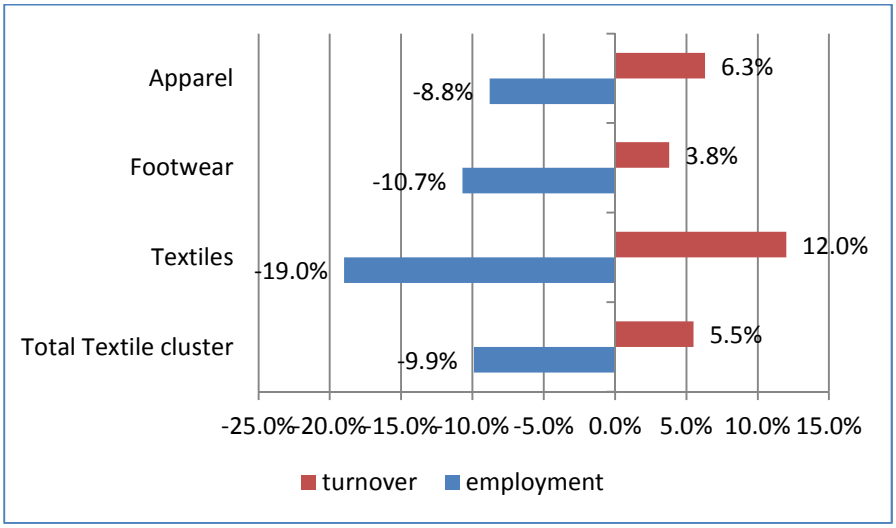
Figure 26. Share of world's imports of apparel / textiles



Source: World Bank staff calculations using the UN-COMTRADE database

Up until mid 2000's textile sector was the dominant activity in the West Region after which this industry lost the top ranking to the auto sector. Since then, the sector has lost significant market share. The World Bank report "Competitiveness of West Romania Firms: Diagnostics, Challenges, and Opportunities" has shown that employment levels in textile, footwear and apparel sectors declined significantly by 19, 10.7, and 8.8 percent in respective order between 2008 and 2010. Yet, the turnover rates showed positive growth by 12, 3.8, and 6.3 percent respectively (Figure 27). Apparel subsector is the fifth largest sector in the region in terms of employment and together with leather and textile subsectors, they employ around 24,000 workers accounting for 8 percent of the employment in the region. Hence despite the drop in market share, the sector remains a major contributor to economic activity in the region.

Figure 27- Performance of the textile sector cluster in the West region (annual growth rate, 2008-2010)

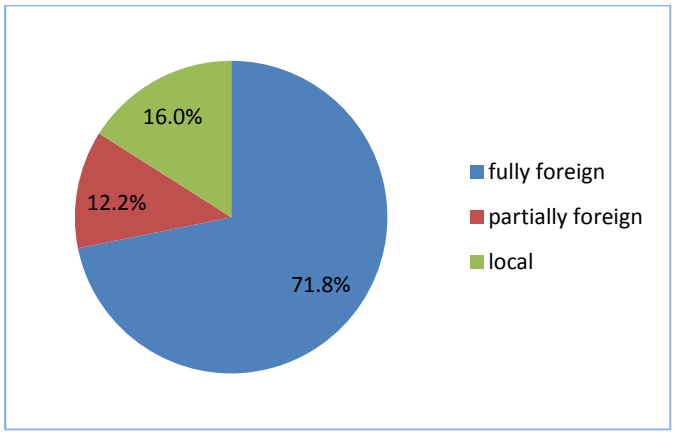


Source: World Bank staff calculation based on SBS data

The three textile activities make up the second biggest contribution to region's exports (following auto sector) accounting for 13.4 percent of the region's exports in 2010 (see Table 15). Exports of textile products have grown by more than 10 percent between 2008 and 2011. However since the exports of auto sector has been increasing much more rapidly, textile sector's share in total exports has been declining. Between 2005 and 2011, this share almost halved, declining from 27% to 14% in total exports (see Figure 18). However, differently from auto sector, firms from textile activities have a higher average age - the sector has 44.4% of its firms with at least 10 (6) years old (Table 8).

As in the automotive sector, foreign firms are quite active in the textile industry of the West Region: exports by fully-foreign owned firms make up almost 70 percent of the total textile exports whereas contribution of local firms is less than 20 percent (Figure 28).

Figure 28 - Percentage of textile cluster exports by ownership type in the West region



Source: World Bank staff calculation based on SBS and customs data

Table 8 - Size and age composition of textile cluster firms in the West region, 2010 (%. of firms)

	Big(>=250)	Medium (50-249)	Small
Age			**(1-49)**
1-5	-	7.6%	10.9%
6-10	3.3%	14.9%	18.9%
+10	3.3%	18.5%	22.5%

Source: World Bank staff calculation based on SBS data

The textiles sector is also dominated by internationally fragmented production globally which defines a similar dynamics as the auto sector in terms of reliance on the same firms, markets and products. The textiles industry chain follows a buyer driven commodity rationale and is marked by power asymmetries between the suppliers and global buyers of final apparel products (see Figure 31.[27] Six distinct value-adding activities can be identified in this chain: (1) research and new product development (R&D), (2) design, (3) purchasing, (4) production, (5) logistics (distribution), (6) marketing and branding, and (7) services[28] - with activities at the top and at the bottom of the list likely to contain more value added than the activities at the center of the list (see Figure 32). In the West region firms are mostly on the production stage (Production/Assembly/Cut, Make, Trim – see specific evidence presented in Table 10- while acting as suppliers of foreign brands. They have not, for the large part, managed to transition to own design and own brand manufacturing.

Overall, the fact that the textile cluster in the West region has become closely integrated into to regional production networks based in Europe has led to significant investments and job creation in the region. Although the whole textile sector has been experiencing decline in its market share**, there are signs of apparent comparative advantages with respect to other economic activities.** Targeted policies for the development of the sector can help the region to participate in higher value-generating activities. Some arguments on why the region still has comparative advantages can be listed as follows.

- The textile sector has been in existence in the region for a long period. It is still one of the biggest employers and contributors to export in the region. A large body of industry-specific

[27] The companies that develop and sell brand-name products have considerable control over how, when and where manufacturing will take place, and how much profit accrues at each stage, essentially controlling how basic value-adding activities are distributed along the value chain. Unlike producer-driven chains, where value added and profits are generated through greater scale, volume and technological advances, in the buyer-driven apparel and textiles value chain, value added and profits come from combinations of high-value research, design, sales, marketing, and financial services that allow the retailers, designers and marketers to act as strategic brokers in linking overseas factories and traders with product niches in their main consumer markets (Gereffi and Memedovic, 2003).

[28] R&D: This value-adding function includes companies that engage in R&D, as well as activities related to improving the physical product or process and market and consumer research. Design: This stage includes people and companies that offer aesthetic design services for products and components throughout the value chain. Design and style activities are used to attract attention, improve product performance, cut production costs, and give the product a strong competitive advantage in the target market. Purchasing/Sourcing (Inbound): This stage refers to the inbound processes involved in purchasing and transporting textile products. It includes physically transporting products, as well as managing or providing technology and equipment for supply chain coordination. Logistics can involve domestic or overseas coordination. Production/Assembly/Cut, Make, Trim (CMT): Apparel manufacturers cut and sew woven or knitted fabric or knit apparel directly from yarn. The cut-and-sew classification includes a diverse range of establishments making full lines of ready-to-wear and custom apparel. Apparel manufacturers can be contractors, performing cutting or sewing operations on materials owned by others, or jobbers and tailors who manufacture custom garments for individual clients. Firms can purchase textiles from another establishment or make the textile components in-house. Distribution (Outbound): After apparel is manufactured, it is distributed and sold via a network of wholesalers, agents, logistics firms, and other companies responsible for value-adding activities outside of production. Marketing and Sales: This function includes all activities and companies associated with pricing, selling, and distributing a product, including activities such as branding or advertising. These companies frequently do not make any physical alternations to the product. Apparel is marketed and sold to consumers (via retail channels), institutions, or to the government. Services: This includes any type of activity a firm or industry provides to its suppliers, buyers, or employees, typically as a way to distinguish itself from competitors in the market (e.g., offering consulting about international apparel businesses or fashion trends).

knowledge has been accumulated. Through their long term engagements with large production networks, local producers have learnt about how MNCs work, what quality standards they require, what technology they use, how they plan for production, their distribution channels for raw materials and finished products. This know-how which has been accumulated over many years makes them well positioned to respond to demand from their clients and to try new activities upstream or downstream the value chain.

- Similarly, direct connections with many multi-national clients in the sector have helped build a business network in the region which can easily generate new business opportunities.
- The geographic location of the region gives it a clear advantage relative to the rest of Romania as well as to many other global competitors through its close proximity to the European market which provides an advantage in terms of transportation costs and facilitates communications with clients.

Despite of these opportunities and strengths of the region, there are drawbacks that can obstruct future development of the overall textile sector. Three such obstacles can be pointed.

First, as already said, most of West Romanian firms are sole suppliers of foreign brands and have not managed to transition to their own designs and own brand manufacturing. As a result of participating in European value chains, value added share of output declined from 49 to 33 percent between 2008 and 2010 (see Figure 40). Therefore, while the region benefits from the spillovers from the linkages with foreign owned companies through human capital – Romanians account for the vast majority of the workforce of foreign-owned firms, including in management and technical positions – it is clear that supply chain linkages between the foreign and domestic sector are very weak in the sector.

Second, the labor force currently employed in the sector is aging and it is difficult to find young workers interested in the business. This will force firms to increase wages which threatens many firms whose only comparative advantage is low costs.

Third, given that textiles industry is typically structured as a buyer driven commodity chain marked by power asymmetries between the suppliers and global buyers of final apparel products, the need to upgrading for West Romanian firms in the sector will not be easily fulfilled as it requires following very well established patterns. After the phasing out of the Multifiber Agreement in 2005, the challenge has become even more difficult as the intensity of competition in the sector has increased significantly due to the low barriers to entry and low appropriability of technology to the advantage of the companies that develop and sell brand-name products.[29]

4.2.2. Specialization opportunities

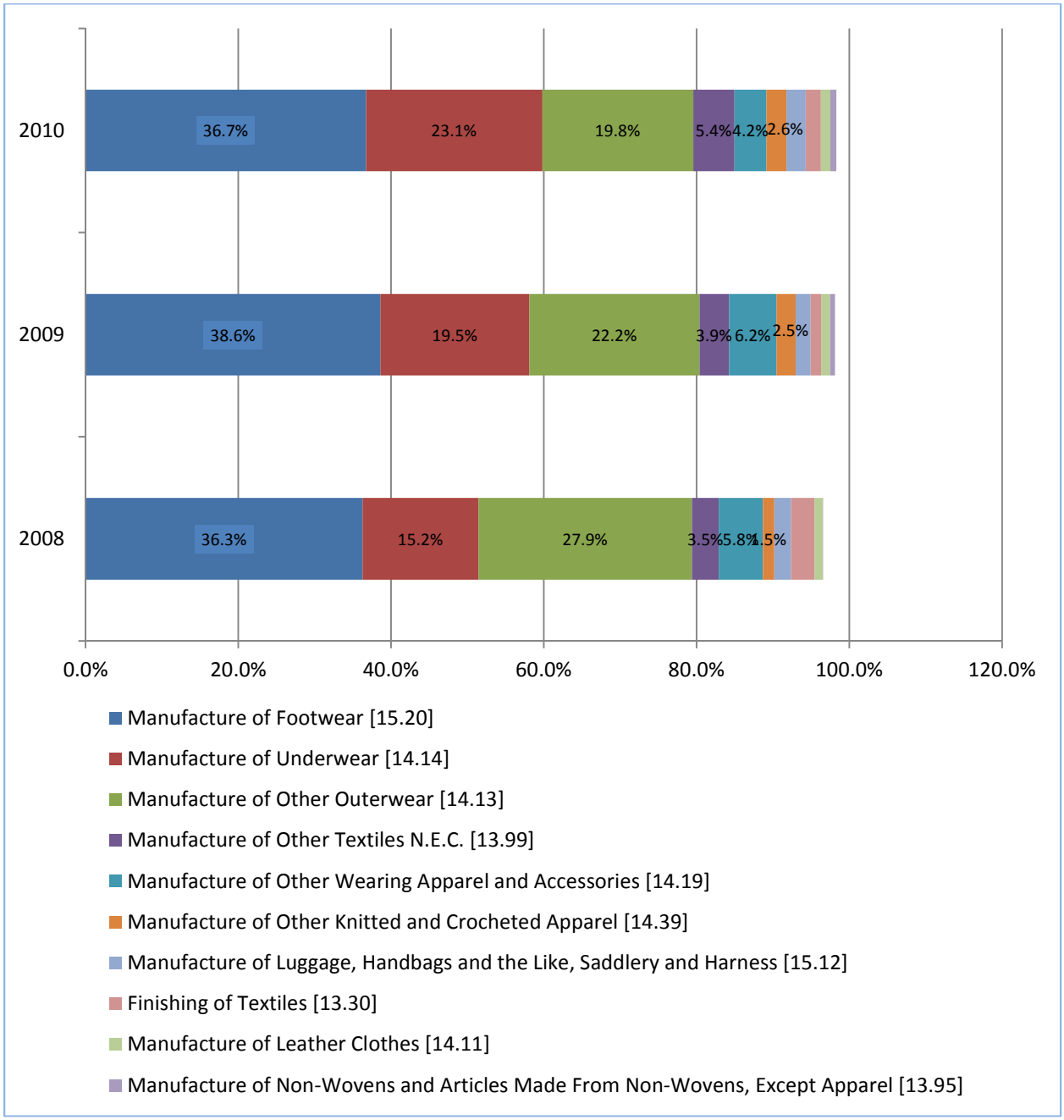
In the search for opportunities to increase value added in the sector, the SBS data can be used as a useful instrument. Data shows that the value added share owned by the top 10 (NACE 4 digit) activities has increased since 2008, from 96.5% to 98.3% of the all value added in the sector, while the first three activities – Manufacture of Footwear, Manufacture of Underwear and Manufacture of Other Outerwear - account for almost 80% of the whole value added generated in the sector (see Figure 29).

Table 9 displays the annual growth rates – in the 2008-2010 period - of the main outcome variables – labor productivity, value added, employment and turnover - for all the top 10 NACE4 digit activities. Four activities emerge as real high growing subsectors over the 2008-2010 period.

[29] These latter have considerable control over how, when and where manufacturing will take place, and how much profit accrues at each stage, essentially controlling how basic value-adding activities are distributed along the value chain.

Manufacture of Underwear, Manufacture of Other Textiles N.E.C., Manufacture of Other Knitted and Crocheted Apparel, and Manufacture of Non-Wovens and Articles Made From Non-Wovens, Except Apparel have presented an annual productivity growth rate that is higher than the average for the whole textile sector and have simultaneously showed a positive performance for at least two of the following variables: employment, value added and turnover.

Figure 29 - Value added share by top 10 activities (NACE 4 digit) in textile sector: 2008-2010



Source: World Bank staff calculation based on SBS data

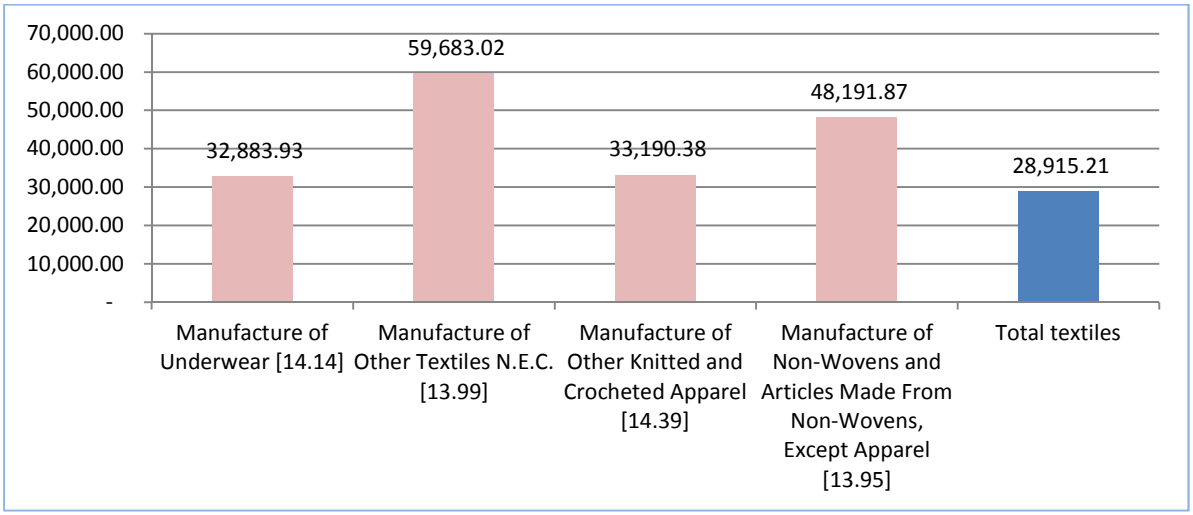
Table 9 - Basic outcome performance for top 10 activities (NACE 4 digit) in textile sector: 2008-2010

	annual growth rate			
nace4_description	**Prod**	**VA**	**Empl**	**Turnover**
Manufacture of Footwear [15.20]	5.7%	-3.7%	-8.9%	5.5%
Manufacture of Underwear [14.14]	10.3%	10.3%	0.0%	8.4%
Manufacture of Other Outerwear [14.13]	-4.6%	-14.5%	-10.4%	-4.9%
Manufacture of Other Textiles N.E.C. [13.99]	19.2%	10.5%	-7.3%	53.8%
Manufacture of Other Wearing Apparel and Accessories [14.19]	6.6%	-13.8%	-19.2%	-6.3%
Manufacture of Other Knitted and Crocheted Apparel [14.39]	18.2%	16.0%	-1.9%	31.7%
Manufacture of Luggage, Handbags and the Like, Saddlery and Harness [15.12]	2.7%	-0.1%	-2.7%	6.0%
Finishing of Textiles [13.30]	38.4%	-16.9%	-39.9%	7.7%
Manufacture of Leather Clothes [14.11]	18.3%	0.9%	-14.7%	-1.5%
Manufacture of Non-Wovens and Articles Made From Non-Wovens, Except Apparel [13.95]	18.3%	172.5%	130.3%	170.5%
Total Textile Sector	5.6%			

Source: World Bank staff calculation based on SBS data
Note: NACE 4 digit codes between brackets

While Manufacture of Underwear is already a strong activity within the textile sector in the region, the remaining activities could be seen as potential niches for further development, particularly if the capacity to generate value added is taken into account. Manufacture of Other Textiles N.E.C. accounts for only 5.4% of the whole value added generated in the sector, and the other two activities respond for only 3.4% ofthe total. By analyzing the 2010 average labor productivity for each one of the highlighted NACE 4 digit activities, numbers suggest that Manufacture of Other Textiles N.E.C., Manufacture of Other Knitted and Crocheted Apparel, and Manufacture of Non-Wovens and Articles Made From Non-Wovens, Except Apparel have higher value added per employee than the overall textile sector which qualify them as potential drivers of value added growth in the future (Figure 30).

Figure 30 - Average labor productivity for selected NACE 4 digit sectors within textile sector: 2010 (Romanian Lei per worker)



Source: World Bank staff calculation based on SBS data

While these subsectors constitute fast growing activities, which qualify them as potential opportunities for further development, it is worth emphasizing that all of them still belong to the production phase of the textile value chain, which in principle provides the lowest value added possibilities when compared with both pre and post production activities (Figure 32). This said, to the extent that moving upstream or downstream along the value chain of the sector is key for the development prospects of the region and given that process and product upgrading through new machinery or innovations from the chemical industry are not feasible, the only other avenue towards upgrading in the textile and apparel sector is through an increasing integration of services and knowledge intensive tasks in the production process. Accordingly value added and profits will be greater in firms move to upstream or downstream segments of the textile and apparel process, i.e. if they do not focus on labor intensive activities at the center of the chain such as sewing, nesting, cutting, press and packaging. This means that value addition will come from increasingly introducing high-value research, design, sales, marketing, and financial services.

An analysis of export data suggests that synthetic fabrics could become an important niche within the sector due to their rising importance in the sector's export basket and their high labor productivity. The "Manufacture of Non-Wovens and Articles Made From Non-Wovens, Except Apparel" and "Manufacture of Other Textiles N.E.C.", already identified in Figure 30), ,are linked to the production of 'Textiles fabrics impregnated with polyurethane' (HS 590320) and 'Textile fabrics impregnated with plastics' (HS 590390) which represent 6.9% and 2.4% of textile/apparel exports in 2011, respectively. It is also worth highlighting that these two products combined represented less than 0.1% of textile/apparel exports in 2005 and have experienced exponential growth rates over the past five years. Anecdotal evidence from interviews indicate that at least some firms in the West Region have been able to find a niche in more technologically advanced synthetic fibers and are already successful at exporting high value-added products like clothing for professional cyclists. According to the same interviews, the high tech synthetic fiber niche provides and advantage not only in terms of higher value added per product but also in terms of less international competition from low cost suppliers like China, Cambodia and Vietnam due to the more advanced technological requirements of the production process.

4.2.3. R&D activity, linkages with RTDI supply and connections with global networks: how does it relate to specialization in the sector?

Unlike producer-driven chains, where value added and profits are generated through greater scale, volume and technological advances in the buyer-driven apparel and textiles value chain comes either through new machinery that allows to develop new techniques or from the chemical industry. Following the typical structure of the textile value (see Figure 31), firms in the textile sector in the West region usually purchase all the necessary machinery and equipment from producers located abroad like Germany, Italy or Japan.

The use of the classification developed by Taymaz et al. (2011) allows for the identification of the way how the textile sector in the West region is connected to the value chain (Table 10) .Two main differences with respect to the configuration of the auto value chain are worth nothing. First, although there is a clear dominant segment in the textiles/apparel value chain, the textile sector in the West Region specializes in exporting final products instead of parts or components like in the auto sector. Second, although exports of finished textiles and apparel have dominated the sector, accounting for 84.3% of the total, exports of raw materials have picked up since 2008, and now represent 12.4% of exports in 2011.

Table 10. How the West region is connected to the textile value chain: exports in the textiles/apparel sector by stage of production (% sector exports in 2011)

Value chain stage/segment	2005	2006	2007	2008	2009	2010	2011
Final products	97.2	96.9	94.5	92.7	90.1	86.5	84.3
Main parts and components	0.6	0.5	1.5	1.9	1.4	1.8	2.0
Raw Material	1.7	2.1	3.5	4.9	7.7	10.4	12.4
Standard parts	0.4	0.4	0.4	0.5	0.7	1.0	0.8

Source: World Bank staff elaboration based on INS customs level data

The product concentration in the dominant segment, namely finished products, is the lowest in the in the textiles/apparel value chain and also relatively low compared to the dominant segment of the auto industry. The most concentrated segment of the textile value chain in the West Region is the production of raw materials. The top 5 products account for more than 85% of total raw material exports and a similar although less striking pattern can be identified for exports of main components and parts.

Table 11: Top exported products in the textiles/apparel value chain, by stage of production

Stage/Segment	HS code	Product	% segment exports	% sector exports	rank
Final products	610821	Women's or girls' briefs and panties of cotton,	10.3	8.7	1
Final products	610910	T-shirts, singlets and other vests, of cotton,	5.9	5.0	2
Final products	610990	T-shirts, singlets, etc, of other textiles, nes	5.3	4.4	3
Final products	621210	Brassieres	5.1	4.3	4
Final products	611512	Panty hose, etc, of synthetic fibres, >=67decit	4.3	3.7	5
Main parts and components	540742	Dyed woven fabrics of synthetic filament yarn,	47.0	0.9	1
Main parts and components	520859	Printed woven cotton fabrics, with >=85% cotton	9.6	0.2	2
Main parts and components	540772	Dyed woven fabrics, >=85% synthetic filaments,	7.7	0.2	3
Main parts and components	511219	Woven fabrics with >=85% combed wool or animal	6.8	0.1	4
Main parts and components	540760	Other woven fabrics of synthetic yarn, >=85% no	6.7	0.1	5
Raw Material	410410	Whole bovine skin leather, of surface area =<2.	40.2	5.0	1
Raw Material	390799	Polyesters, in primary forms, nes	24.6	3.1	2
Raw Material	410439	Bovine and equine leather, prepared after tanni	12.7	1.6	3
Raw Material	410431	Full-grains, splits of bovine and equine leathe	5.0	0.6	4
Raw Material	410110	Whole hides and skins of bovine animals, =<8kg	4.2	0.5	5
Standard parts	550969	Yarn, <85% acrylic or modacrylic staple fibres,	36.0	0.3	1
Standard parts	540110	Sewing thread of synthetic filaments	14.3	0.1	2
Standard parts	550620	Synthetic staple fibres, of polyesters, carded,	12.5	0.1	3
Standard parts	540233	Textured yarn of polyesters, nprs	6.5	0.1	4
Standard parts	540231	Textured yarn, of nylon or other polyamides, =<	4.1	0.0	5

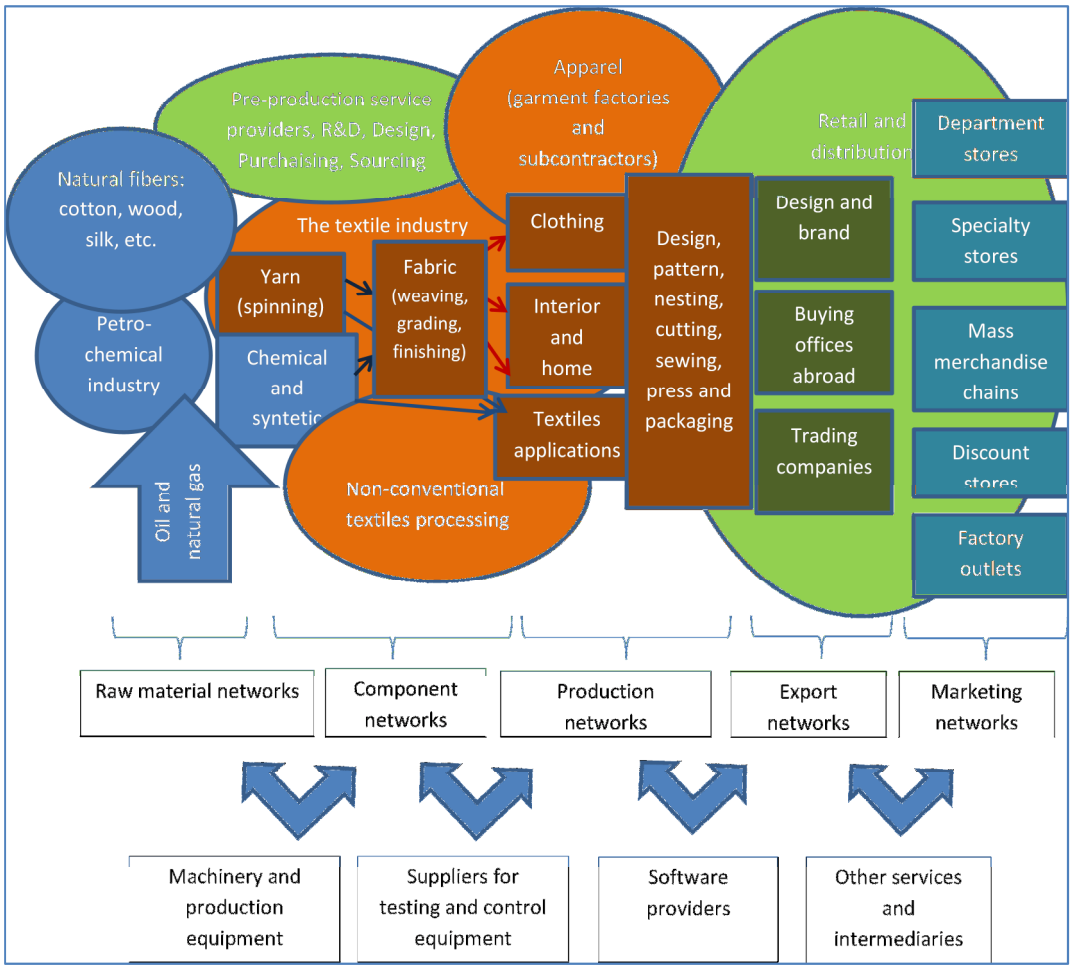
Source: World Bank staff elaboration based on INS customs level data

The fact that the organization and functioning of the textile sector in the region is tightly linked with the global value chain through the production of final products – which in principle offers the lowest value added possibilities (see Figure 32) - has consequences over the R&D activity carried out locally. In fact, there is no local R&D capacity to produce new machinery or to adapt the imported machinery and equipment to the needs of local firms. These investments are costly and are beyond the reach of the sector in short to medium term. Most of the time, the foreign clients conduct the research and undertake design and development of new products. Also the material inputs are either provided or suppliers of such materials are imposed to the textile companies by their clients. The local firms only provide production capacity with limited use of use of technology and little involvement in knowledge intensive. This constrains the sectoral activity to labour intensive production activities that have the least value added.

Overall, there is little effort to increase the knowledge-intensiveness of the textiles sector. Incremental innovations in this sector, such as the development of a new dyeing technique or a more durable material with collaboration from chemicals firms in the region can lead to large gains in terms of increased competitiveness in the sector. The data tells that such efforts in the West Region are close to non-existent. Out of the 11 applications made from the West Region's manufacturing firms to the NASR-funded R&D projects in the last programming period, only one is in textiles sector. Against this background, the exceptions are firms who have acted on the risks of losing competitiveness by engaging in vertically integrated activities and offered complete products instead of parts for further assembly process. Through these integrations their design and development skills evolved. These companies provide learning opportunities for the rest of the rest of the sector and their efforts should be advocated.

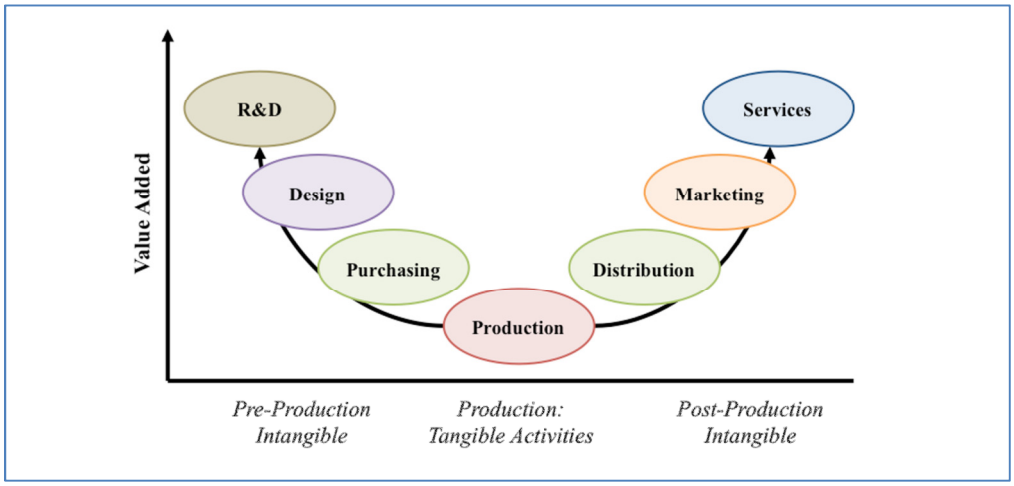
From the RTDI supply perspective, it is worth noting that practical incremental innovations in the textiles sector are not on the research institutions' agenda either. Overall, the interactions between academia and the private sector are low. The Aurel Vlaicu University of Arad undertakes research on textiles and biotechnologies, which, if commercialized, may help in initiating the desired increase in value added in the sector. It has been noted that it is very difficult for the university staff to reach out to the private sector to explore collaboration opportunities, mainly because of teaching and ongoing academic research duties. By the same token, the university benefits from the initiatives of Tehimpuls to inform the academics of partnership possibilities with the private sector.

Figure 31 - Complexity of the apparel value chain



Source: Fernandez-Stark, Frederick and Gereffi (2011)

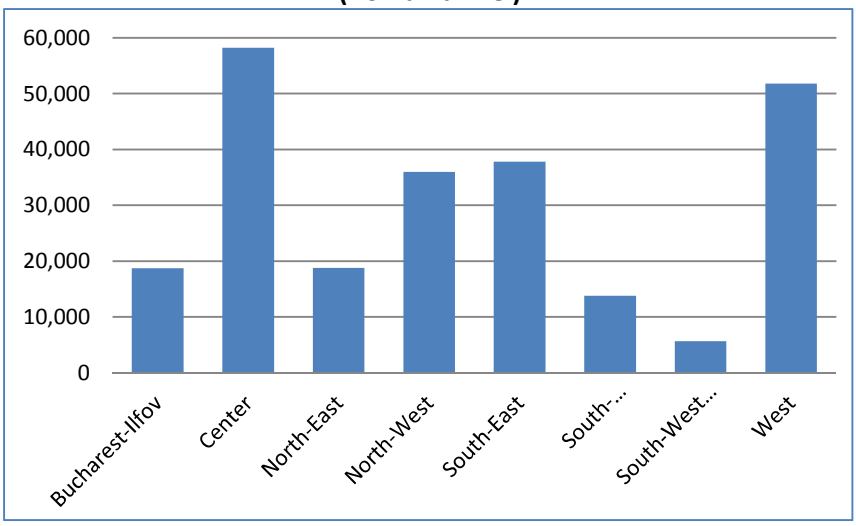
Figure 32 - Curve of value added in the apparel value chain



Source: Fernandez-Stark, Frederick and Gereffi (2011)

Some positive perspectives can be pointed, however. West Region has the second highest ICT investment amount in Romania after the Center region (Figure 33). The relationship holds both for ICT hardware and software investments. This evidence shows the sector's relatively high collaboration with ICT sector which is usually taken as an indication of capacity to adapt new and better technologies.

Figure 33 - Average ICT investments by textile sector firms across regions, 2010 (Romanian Lei)



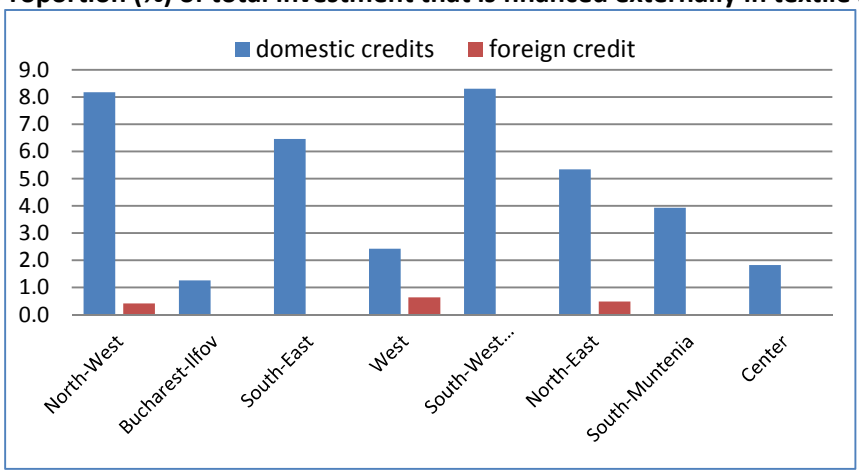
Source: World Bank staff elaboration based on INS data

4.2.4. An evaluation of the horizontal constraints that affect the sector

Access to external finance

Many firms in the sector are reluctant to uses bank financing for their investments due to unpredictable economic conditions and their low aptitude for risk. Only 2.4 percent of total investments are funded through domestic credit and 0.6 percent through financial credit (Figure 34). As a result, some textile companies prefer to decline orders for which they do not have the necessary equipment than contemplate the opportunity of investing in machinery and equipment for new but risky products.

Figure 34 - Proportion (%) of total investment that is financed externally in textile sector, 2010



Source: World Bank staff elaboration based on SBS data

Companies are aware of the availability of the EU funds but generally lack clear information regarding application and eligibility. Those who have applied for the EU funds find the process cumbersome and the evaluation period lengthy.

Skills and training

Insufficient number and poor quality of labour force are the most severe obstacles for business development in this sector. Average worker in textile companies is aging much faster than most other sectors. Firms in the sector are having difficulties to find both skilled and unskilled people to work in plants. There is dwindling interest from young people to work in factories as low-skilled workers to operate sewing machines. Moreover large international automotive manufacturers located in the region are able to pay higher salaries and provide better work opportunities which aggravate the labour supply problem of the textile sector. There is high employee turnover rate for the sector which lowers labour productivity.

A concern shared together with the auto sector is relevance of the curriculum thought at universities for the sectoral needs. University graduates lack minimal practical competencies. There is a disconnection on what is needed by the sector and what is offered at schools to fulfill the demand for skilled workforce. Moreover, number of available mid-level technicians (low-skilled workers) is also shrinking fast due to closing down of many vocational schools and a dwindling interest among young people in this type of jobs. There are certain training programs for the market mostly financed by EU funds. However the administrative barriers are high and the funds from the programs are small.

Transport infrastructure

As in the auto sector, two main aspects of infrastructure stand out as major obstacles for the sector. First one is electricity. However unlike auto sector, for this sector the bigger concern is the cost of electricity. Liberalization of the energy market is likely to increase prices which is concerning for textile companies. The prices have been constantly increasing since 2007, which translates into higher costs of production. The energy prices are expected to be even higher when the market becomes completely liberalized at 2014. This will cause significant loss of competitiveness for firms in the region.

The second constraint is road infrastructure. The main way of transportation in and out of the region is through roads and there are not sufficient high-ways in the region. However this concern is compensated with the proximity of the region to the border. From the Hungarian border westwards road infrastructure is sufficient to meet their needs. Another reason why road infrastructure is a concern is transportation of workers to factories, as companies need to hire private transport services for their employees. Lack of good infrastructure also inhibits firms to seek workforce in towns further away from their location. Based on feedback from textile firms, the advantage of hiring cheaper labour force from the rural areas is partly offset by the need offer free transport services.

Legal framework

The administrative burden generated by the unpredictable interpretation of legal provisions and the large number of random inspections have negative impact on firms' activities. Obtaining permits and authorizations or filing of taxes are considered time consuming and expensive.

Textile companies lack negotiating power against large multinational clients and tend to strictly observe contractual provisions. If their foreign clients breach contracts local textile producers have to

seek contract enforcement abroad where the governing law courts are usually located. This is quite costly and they do not have the capacity to pursue these proceedings.

4.2.5. Prospects for sectoral development and considerations for policy actions

Textile sector as a whole has been a major role contributor to the economic activity in the region. Existence of foreign firms in the region and engagements with global clients create opportunities for knowledge and technology being transferred to local economy. In fact, the typical market positioning of the sector seems to be in niche apparel products and production for large foreign clients. In this context, continuing to specialize in commoditized activities like simple labor assembly or cut-make-trim in apparel makes the basis for regional competitiveness cost driven.

Data analysis have identified high growing sectors in terms of labor productivity – as Manufacture of Underwear, Manufacture of Other Textiles N.E.C., Manufacture of Other Knitted and Crocheted Apparel, and Manufacture of Non-Wovens and Articles Made From Non-Wovens, Except Apparel – which qualify them as potential niches for further specialization. However, as all of these activities still belong to the production phase of the textile chain, which in principle provides the lowest value added possibilities when compared with both pre and post production activities, it is also important to combine this specialization with an increasing integration of services and knowledge intensive tasks in the production process.

Against this background, RIS3 policies can help the sector to develop sustainable comparative advantages over medium to long term by supporting high-value research, designs, sales, and marketing services. Policy makers should actively support investments seeking to increase the value-added in production, facilitate development of new designs and enable entering new export markets.

Many local firms in the region conduct labour intensive activities with the lowest contribution to the value chain such as sewing, nesting, cutting, press and packaging. However, in textiles/apparel sectors, major innovations come either through introduction of new machinery and equipment for production or from chemical industry. Development of local capacity to build new machinery and equipment is not feasible in the short to medium term but would be investigated for a long-term strategy as the knowledge embodied and value generated in machine production is significantly high. Similarly research capacity on chemical industry in the region is poor and developing this capacity is not a feasible strategy for the time being. Other than these two areas there are many alternative routes that policy makers can support local firms. Subsiding acquisition of machinery to conduct certain important activities such as making patterns and grading using automated systems or dying fabric would facilitate creating higher value added in production. Moreover, developing the skills set to perform activities requiring more knowledge and use of technology such as quality controls for shrinkage, colors, rubbing fastness would complement the high value creation in production. Firms that succeed generating higher values and broadening the line of activities they performed will be able to compensate higher wages which will attract more high skilled workers to the sector.

Expanding into these new activities and especially introducing a new design or a product requires use of new technology and equipment. This is extremely difficult for many local firms in the sector for two reasons: difficulties accessing to external finance and reluctance to take risks. Pursuing a new line of activity requires strong commitment complemented with ambition to succeed and relevant business management skills. Many local producers who focus on the production activities lack these assets. To close gap on financing, government can provide tax incentives or subsidies on productive investments especially on new technology and machinery or provide better financing terms for

investments. On the second issue, government can help firms to develop better business management, marketing, and networking skills.

Efforts to support local firms should be complemented with improvements in education system through adjusting university curriculum to the needs of the sector and providing trainings to develop necessary skills and capacities for fashion design, product development, use of frontier technology in production, and marketing.

Low-skilled blue collar workers need to be incentivized to work in the sector. In the apparel sector workers get paid by the number of products they produce whereas in other sectors they get fixed salaries. They need to be better compensated and provided better work conditions which are only possible if productivity in production increases. Otherwise, firms cannot keep their current competitiveness. Increasing productivity in turn relies at first on access to better technology and machines such as automated cutting machines and second on providing a wider range of services with higher value generation. With new and better technology firms get flexibility in adapting to client needs. They would also need less lead time to complete a production which will allow them to be able to produce smaller amounts of different types of products. There are firms in the sector who have already shown signs of upgrading potential by developing their own design capabilities.

In this context, a successful example for West Romania of upgrading to higher value added activities within the textile and apparel sector comes from Turkey, as highlighted in the World Bank report on "Competitiveness of West Romania Firms: Diagnostics, Challenges and Opportunities". A two-step policy approach was adopted in this country. First, Turkish firms moved into the design segment of the value chain as part of a broader strategy to establish the country as a fashion center. Industry associations and government agencies collaborated to promote Istanbul as a leading fashion center, and under this context support was provided to build a specialized and skilled workforce. Organizations such as IKTB worked with the private sector and government agencies to establish fashion design vocational training schools. In addition, Istanbul Fashion Academy, established by a collaboration between the EU and IKTIC, trains students to the use of the latest technologies, fashion, design, product development, specialized photography, media, management, and marketing. Second, in the following step, upgrading into own branding after own design was supported by the Turkish government, which granted incentives for firms willing to upgrading into branding. These incentives include reimbursements up to 60% of the cost for a maximum of three years of personnel expenses, machinery, equipment, software, consultancy, and R&D related material. Local firms that were originally full-package suppliers with international brands are now leading local companies with own brands and retail outlets abroad. Developing own branding has required an additional effort in terms of fostering adequate workforce development. Organizations such as IKTIB offer short courses in marketing, sales, brand management, recruiting, selection strategies and value added production. KOSGEB provides marketing support to small and medium sized firms and offers training and consulting services for firms to build their capacity in the sector.

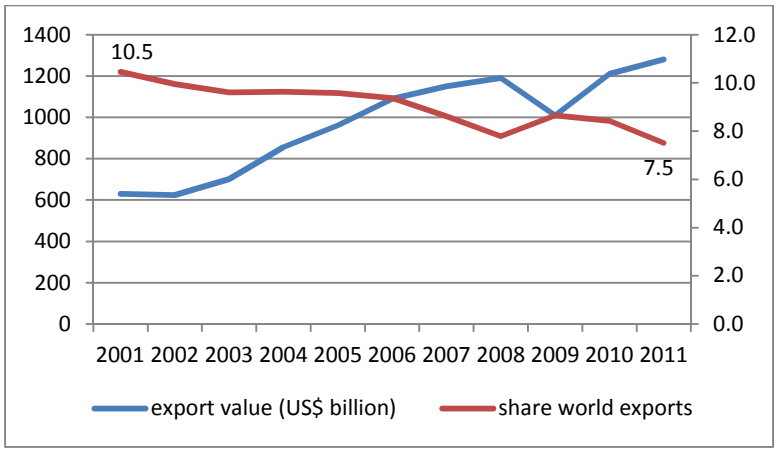
4.3. ICT sector

4.3.1. Sectoral overview, comparative advantages and challenges

The worldwide market of ICT products have expanded in the recent period: world exports in the ICT *hardware* sector grew at an annualized growth rate of 7.3% between 2001 and 2011 which represented a twofold increase over the last decade. World's exports doubled between 2001 and 2008 before experienced a decline of 15.2% in 2009 in the aftermath of the global financial crisis. However,

exports rebounded in 2010 with an annual growth rate of 19.8%. Despite the growth experienced by the sector in the last decade, the share of the world's total trade accounted for by the ICT hardware sector declined from 10.5% to 7.5% between 2001 and 2011.

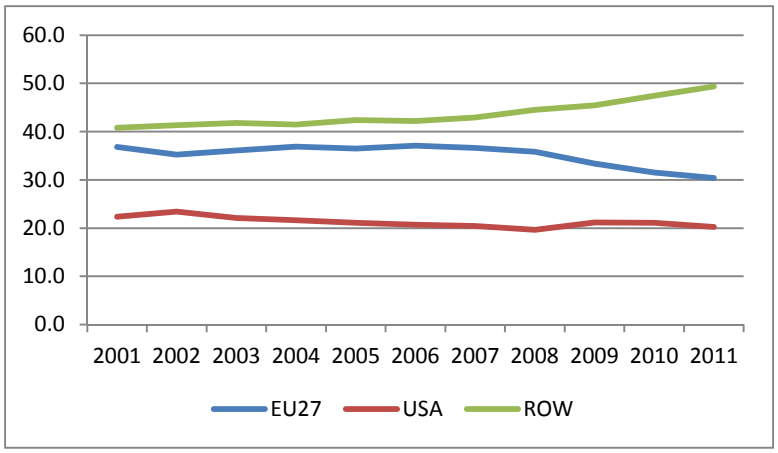
Figure 35 -ICT Hardware: Export Value and Share of Total World Exports



Source: World Bank staff calculations using the UN-COMTRADE database

The EU-27 and the United States account for half of the world's exports in the ICT hardware sector in 2011. The United States has maintained its share of world exports at about 20% for the last decade while the EU-27's share declined from 36.8% to 30.4% between 2001 and 2011. It is worth nothing that these *worldwide* numbers cover only the manufacturing ICT industries (i.e. ICT hardware) as only goods transactions are recorded in the UN-COMTRADE database. The services part of the ICT industry (i.e. software) is not covered in this analysis.

Figure 36. Share of World's Imports of ICT Hardware Sector



Source: World Bank staff calculations using the UN-COMTRADE database

In a region where basic manufacturing has been the main source of value added, ICT activities emerge as one of the few successful knowledge-intensive service sectors. Taking advantage of the significant human capital supplied by regional universities, the ICT sector in the West Region is generally regarded as an internationally competitive player in the areas of software development activities as well as design and engineering. Different from automotive and textile, the ICT sector in the West region has a younger profile with only 21.7% (62.2%) of its firms with at least 10 (6) years old in 2010 (Table 12). In

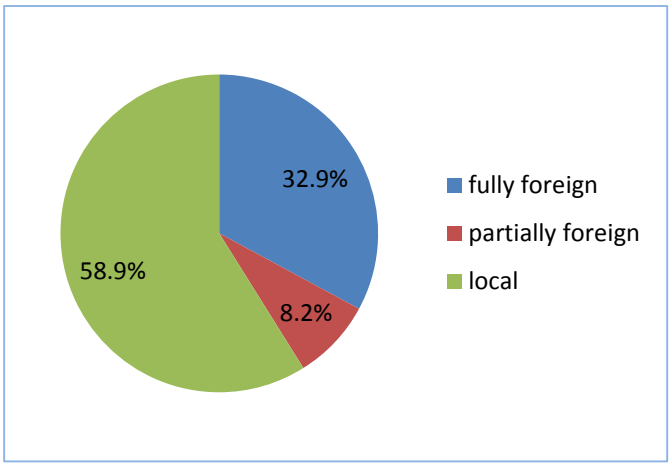
the same year (the latest available date), the sector - which has a strong presence of foreign ownership (see Figure 37) - accounted for almost 10,000 full time employees, responding for 4% of total employment in the region.

Table 12 - Size and age composition of textile cluster firms in the West region, 2010 (%. of firms)

Age	Big(>=250)	Medium (50-249)	Small (1-49)
1-5	0.7%	2.8%	34.3%
6-10	3.5%	7.7%	29.4%
+10	0.7%	5.6%	15.4%

Source: World Bank staff elaboration based on SBS data

Figure 37- Percentage of ICT sector firms by ownership type in the West region, 2010

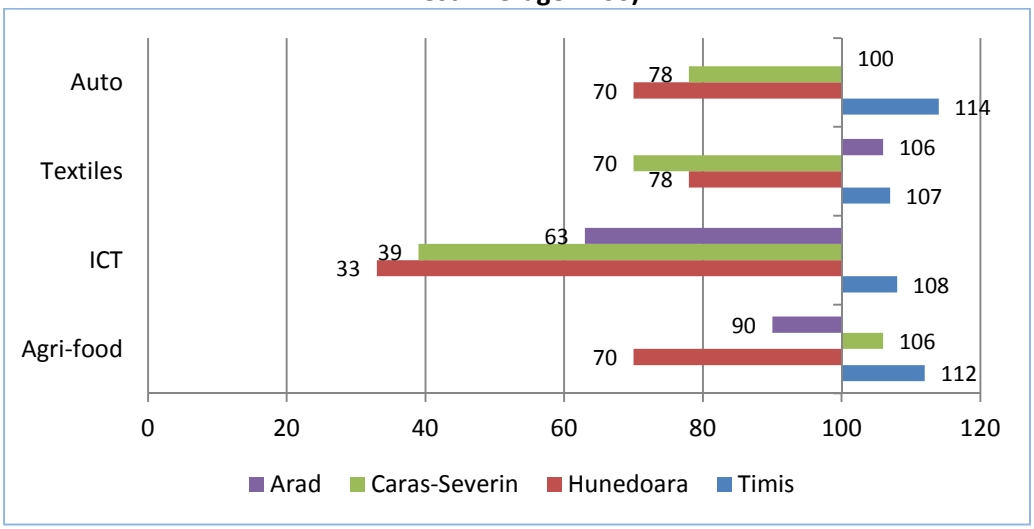


Source: World Bank staff elaboration based on SBS data

In terms of export performance, ICT sector has been presenting a promising trend by doubling its importance in the West Region overall export basket (from 1.7% to 3.2%) over 2008-2011 period (see Figure 18). However, the cluster remains a marginal player in the region and still lags behind the North West region, where the ICT sector (especially electronics and telecommunications equipment) is the main export sector and represents about a third of exports.

The majority of ICT companies are located in Timis, while only a handful of firms are present in Arad and Hunedoara. This geographical agglomeration is strongly linked with variation in productivity performance across counties (see figure below). In this respect, the ICT sector stands out the most when compared to other traditional clusters of the West region.

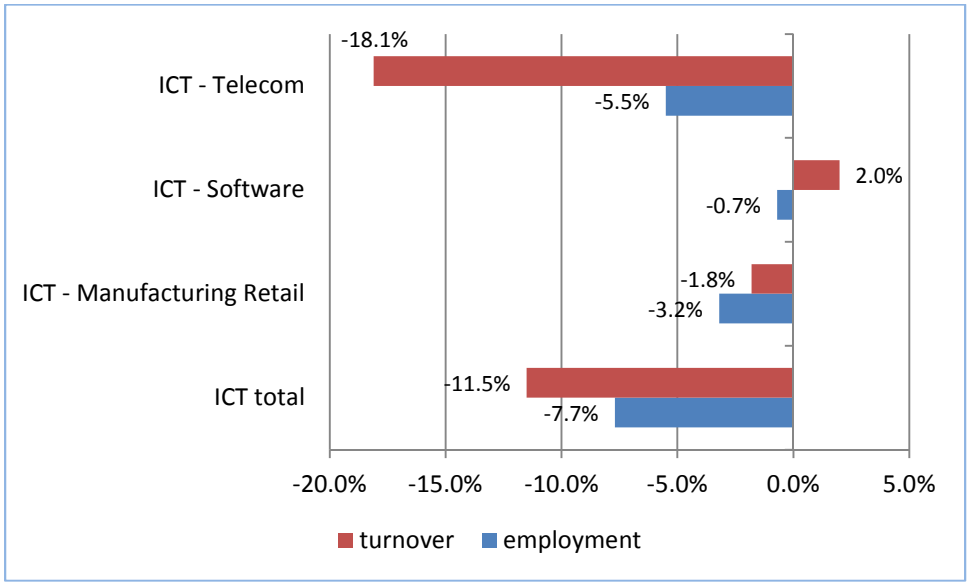
Figure 38 - Comparison of Value-Added Per Worker (2010) in West Region's Main Clusters (Index: West Average= 100)



Source: World Bank staff elaboration based on SBS data

The sector has recently suffered setbacks due to the economic crisis. Between 2008 and 2010, turnover declined by 11.5% and employment by 7.7%. This contraction was driven mainly by the negative performance of the telecommunications sector (-18.1% and -5.5% in terms of turnover and employment, respectively). It is worth noting that the only good performer in the sector was the software development activity, which registered a modest increase in turnover (2%) and a minimal decline in employment (-0.7%).

Figure 39- Performance of the ICT sector in the West region (annual growth rate, 2008-2010)

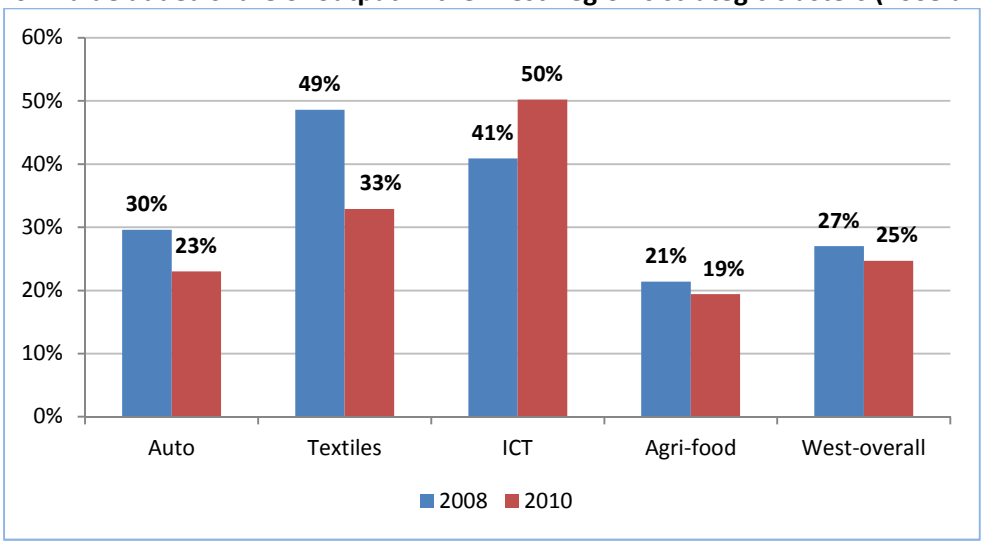


Source: World Bank staff elaboration based on SBS data

However, during the same timeframe, the ICT sector as a whole was able to increase the value added share of output (Figure 40). In fact, it was the only cluster in the region which increased its

contribution to value added over time, which reflects the potential of the sector to act as a knowledge-driver and enhance the competitiveness level of the West Region (see the World Bank report "Territorial Assessment: Profile, Performance, and Drivers of Growth").

Figure 40 - Value added share of output in the West Region's strategic clusters (2008 and 2010)



Source: World Bank staff elaboration based on INS data

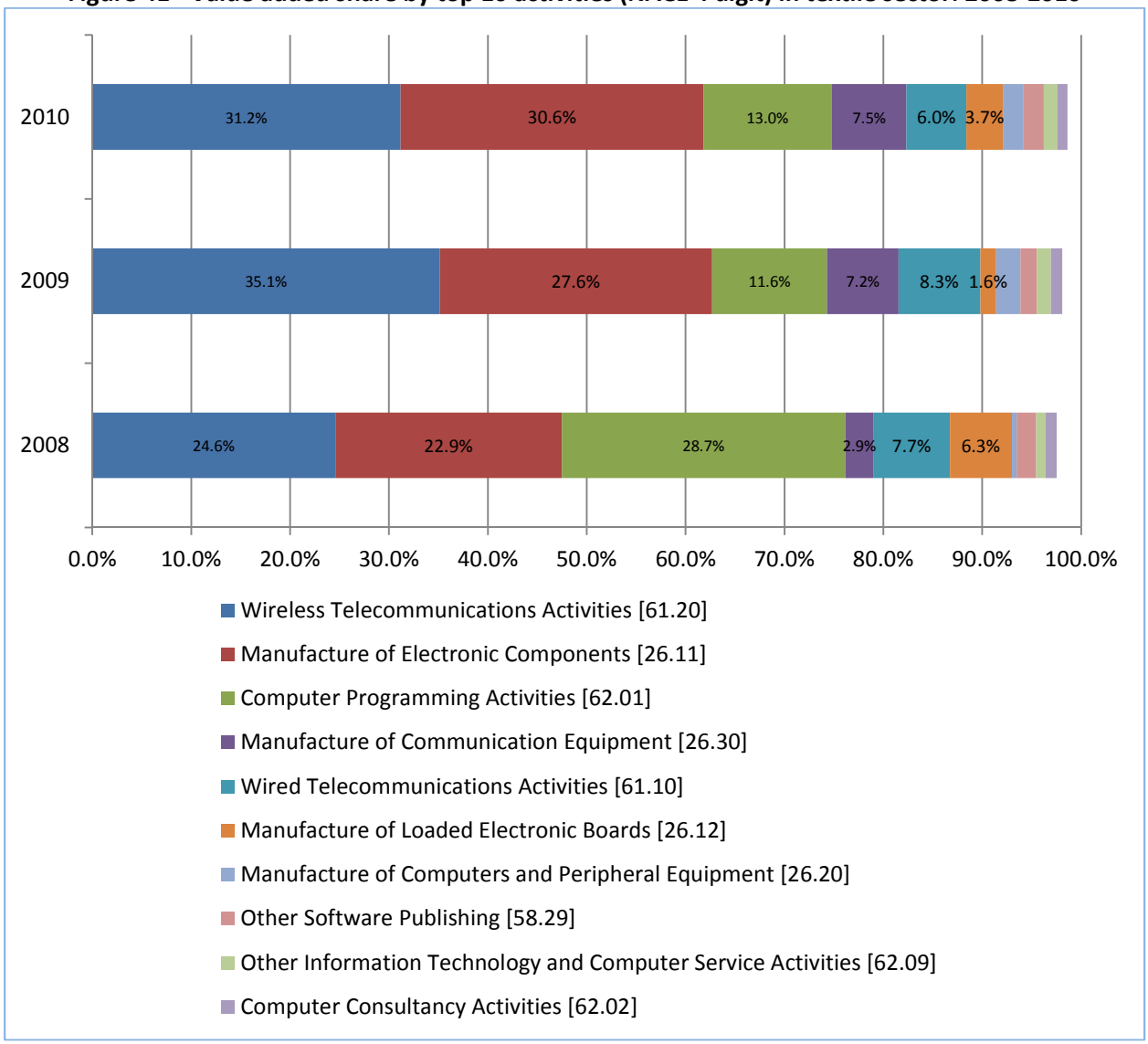
Although the ICT sector has recently experienced the effects of the crisis, there are clear signs of apparent comparative advantages with respect to other sectors. Low wages and skilled workforce seem to be the main advantages of West Romania in the ICT sector. A number of international firms have chosen Timisoara over other locations in order to capitalize on the local advantages in terms of skill availability, particularly mathematics and computer science which are areas of strength of the local universities, and low wages, while enjoying the benefits of a EU location.

While for auto and textiles sector the overarching challenge is to increase the value added content by moving up the value chain structure, for ICT sector the biggest challenge is to expand their activities as a whole. In this regard, identifying opportunities for ICT specialization in the near future is key for both sector's expansion and, more importantly, for the economic development of the whole region as ICT has well known spillover effects particularly over the user activities.

4.3.2. Specialization opportunities

The analysis of INS data provides a useful opportunity to identify high growing activities within the whole ICT sector. Data shows that the value added share owned by the top 10 (NACE 4 digit) activities has slightly increased since 2008, from 97.5% to 98.6% of the all value added in the sector, while the first three activities – Wireless Telecommunications Activities, Manufacture of Electronic Components and Computer Programming Activities – account, on average, for 75% of the whole value added generated in the sector in the 2008-2010 period (see figure below).

Figure 41 - Value added share by top 10 activities (NACE 4 digit) in textile sector: 2008-2010



Source: World Bank staff elaboration based on SBS data

By examining the annual growth performance of (labor) productivity, turnover, value added and employment, three NACE 4 digit activities emerge as high growing subsectors: Manufacture of Communication Equipment, Manufacture of Computers and Peripheral Equipment and Other Information Technology and Computer Service Activities. According to Table 13 these activities have presented a productivity increase higher than the sector average and simultaneously a positive performance of at least two out of the other three outcome variables. These 'emerging stars' account together for 11% of the whole value added generated in the whole ICT sector in 2010: Manufacture of Communication Equipment (7.55%), Manufacture of Computers and Peripheral Equipment (2.08%) and Other Information Technology and Computer Service Activities (1.37%). For all of these subsectors the average productivity level (in 2010) is below the average of the whole ICT sector which suggests a catch up process that can be completed in the near future.

Table 13 - Basic outcome performance for top 10 activities (NACE 4 digit) in ICT sector: 2008-2010

	annual growth rate			
nace4_description	**Prod**	**VA**	**Empl**	**Turnover**
Wireless Telecommunications Activities [61.20]	0.7%	0.2%	-0.5%	-19.4%
Manufacture of Electronic Components [26.11]	7.5%	2.0%	-5.1%	-4.8%
Computer Programming Activities [62.01]	-2.1%	-28.9%	-27.4%	-33.6%
Manufacture of Communication Equipment [26.30]	9.5%	27.7%	16.6%	21.0%
Wired Telecommunications Activities [61.10]	-2.4%	-14.7%	-12.5%	-13.7%
Manufacture of Loaded Electronic Boards [26.12]	-10.1%	-22.3%	-13.6%	-16.3%
Manufacture of Computers and Peripheral Equipment [26.20]	4.4%	50.9%	44.6%	61.0%
Other Software Publishing [58.29]	1.9%	-6.2%	-8.0%	-3.5%
Other Information Technology and Computer Service Activities [62.09]	10.2%	5.3%	-4.4%	10.9%
Computer Consultancy Activities [62.02]	25.0%	-10.8%	-28.7%	-0.6%
Total	1.8%			

Source: World Bank staff elaboration based on SBS data

The lack of export data for service sectors, including ICT, prevents a detailed analysis of export potential for the ICT cluster. However, the identification of specialization opportunities for the whole ICT sector in the West region can go beyond the activities highlighted so far when one considers also the opportunities that emerge from cross sectorial demands. In this regard, three main specialization avenues can be explored.

First, in the context of an aging European population and building on the EC strategy to promote the use of e-health services, the provision of both electronic health records and information service activities to share data between patients' health service providers, hospitals, health professionals and health information networks arises as an additional field for specialization. In this case, the NACE 4 digit sectors of Data processing, hosting and related activities (63.11) and Computer programming activities (62.01) are to be highlighted. Second, in the context of tourism expansion, the management of information on touristic attractions and hotel availability become a key component of a broad marketing strategy to reach customers (see Figure 72). In this regard, the NACE4 digit activity of Web portals (63.12) constitutes a potentially fruitful area for further specialization. Third, the further development of existing links with automotive sector seems to be another option. In this case, the customized software for automating trading and production processes continues to be a fruitful opportunity. For the agro food sector, which is in a still incipient phase of expansion – when compared to automotive – the use of ICT services (particularly through these software solutions - become even more relevant. In this case the NACE 4 digit Computer programming activities (62.01) needs to be highlighted.

4.3.3. R&D activity, linkages with RTDI supply and connections with global networks: how does it relate to specialization in the sector?

Due to the lack of export data for service sectors – which includes ICT services – it is not possible to apply the Taymaz et al (2011) methodology to identify the exact way the ICT sector in the region is connected to the global value chain. However, the presence of foreign owned firms in ICT sector in the region reflects in some extent the way the sector is connected with the global networks. The majority of firms interviewed as part of this analysis develop software exclusively for the headquarters of the

mother company or for a single foreign firm that outsources this task to the firm in the West Region. In addition, MNEs as well as local SMEs do not have any important clients in the West Region or in Romania and do not seem particularly interested in exploring opportunities to working with other firms in the region (mainly because the work for their sole client is already consuming all their time and resources). However, there is still space for policies to support linkages between ICT firms connecting with global customers and to support ICT companies in the region to cooperate with each other or with other industries in the region.

In terms of links with RTDI infrastructure, it is often said that universities usually do not have the structure to get involved in partnerships with the private sector. The academic entrepreneurs and businesses in the region relate this to the low quality of research at universities, mainly driven by the teaching oriented agenda and the lack of private sector focus. Under this context, the most important actors of RTDI infrastructure for ICT sector are the business incubators, particularly UBIT which initially targeted startups in the ICT sector, primarily software development firms. UBIT activities focus on networking and training in areas such as marketing, legal advice and accounting. The main benefit to the tenants is the heavily subsidized rent (by 75%). While startups initiated by former MNE employees are unusual among UBIT tenants, the most successful tenant is a MNE spin off. MNE employees usually have better technical skills and knowledge of the market, and they have the potential to create high growth startups. However, MNEs tend to recruit the best students by offering competitive salaries and job stability, which can discourage talented engineers to start an uncertain new venture. UBIT has no market test for the recipients of its mentorship and training services, as these are offered by the incubator mostly pro bono. There are promising efforts to create local tech "communities", but these are the result of voluntary initiatives and have not generated any funds for UBIT. The graduation policy for tenants is not enforced. Tenant firms are typically startups with less than 2 years of activity, but currently there are firms located here that are older than 5 years, and which continue to enjoy the subsidized rent and services offered by UBIT.

Currently UBIT has ceased to exist as an incubator but the tenants continue to pay a subsidized rent and remain on the premises. Meanwhile, there are at least two other business incubator initiatives in Timisoara: a Startup Hub located in Timisoara's Business Center and the Timisoara City Council incubator, which is still in construction. Two key issues are important regarding incubators. First, the supply of infrastructure (i.e. space and services) is likely to be unbalanced in comparison to local demand. Second, although UBIT has been a catalyst for the local software community, there are significant lessons that should be drawn from this experience.

4.3.4. An evaluation of the horizontal constraints that affect the sector

Skills and training

The availability of qualified labor is the most pressing issue faced by ICT firms in the region. The competition for the same pool of qualified labor is intense between MNCs. Such competition can give rise to major hiring difficulties for local software SMEs. In order to remediate the lack of adequate knowledge and skills of new graduates from the local universities, all firms provide extensive training. Most firms consider that some training is necessary in the industry as universities provide basic knowledge and most programming skills are developed on the job.

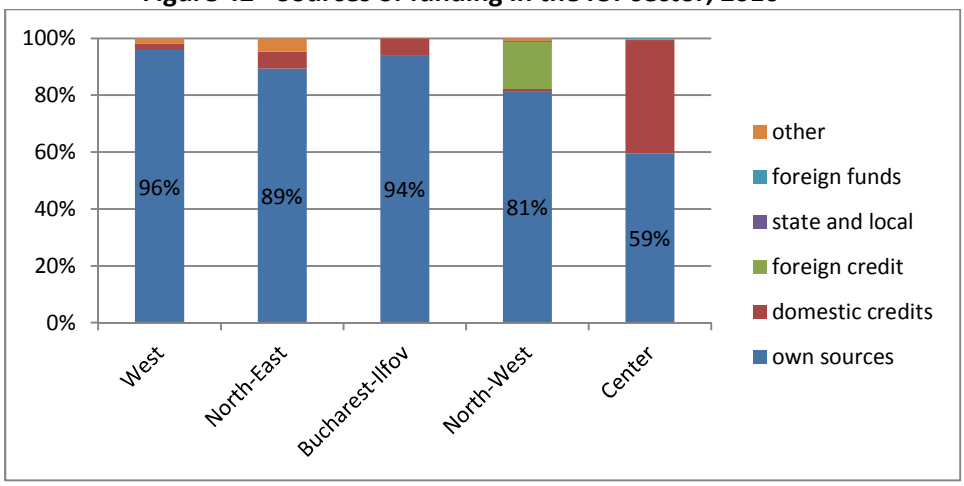
In this regard it was observed that, while universities and ICT start ups favor a holistic education, MNEs advocate for more specific training in, for example, specific software programming languages. The quality of the average graduate from local universities in ICT related fields, such as computer

science, is perceived to have declined over time, although the five to ten percent of graduates are still considered to be top performers. As a result, the availability of skilled labor could become a constraint in the medium term if the sector continues to grow at a fast pace. Expanding the pools of graduates who meet the requirements of the private sector will require a more practical and market-based curriculum, as well as training programs for faculty to ensure that instructors are aware of the latest developments in the field. In addition, the application, selection and graduation requirements in ICT-related study areas should become more rigorous. The current funding system used by universities, which allocates financial resources to specific departments based on the number of enrolled students, can skew the selection incentives and may have a negative impact on the skill-set of graduates.

Finance

Almost all of the financing for ICT firms comes from internal funds (see Figure 42). This situation is not particular to the West Region, as ICT firms in other regions are in a similar situation. In the case of multinational companies, the source of those internal funds is either from the Romanian subsidiary or funding from headquarters. Other financing channels include the use of bank credits and EU funds. In both cases, stakeholders consider that paperwork is time-consuming and interest rates are high. However, the interest rates have improved compared with a decade ago. EU funds have been accessed mainly by mid-size firms, which complain that reimbursements for pre-financed investments take a long time and even extend past the date specified in the contract.

Figure 42 - Sources of funding in the ICT sector, 2010



Source: World Bank staff elaboration based on INS data

Transport infrastructure

Transport infrastructure is not perceived as a problem for any of the firms interviewed. No problems were reported with electricity or internet connectivity and speed – the latter was highlighted as one of the comparative advantages of the region. The firm located in Hunedoara complained that it is not easy to reach their clients in the West Region (mainly in the Timisoara and Arad) and that a highway might help in this regard.

4.3.5. Prospects for sectoral development and considerations for policy actions

Firm-level data analysis has pointed some NACE 4 digit sectors as - Manufacture of Communication Equipment; Manufacture of Computers and Peripheral Equipment; and Other

Information Technology and Computer Service Activities – as potential opportunities for further specialization. Complementary opportunities have emerged from cross sectorial demands – as Data processing, hosting and related activities; Web portals; and Computer programming activities. Against this background, and considering the constraints the sector faces in the region, it is possible to identify specific areas for policy intervention. However, as already stressed, these policy areas will focus primarily on actions that can enhance growth potential at the level of the sector as a whole and not at the NACE 4-digit level, since this would inevitably focus (and potentially benefit) a very small number of firms. This said, since knowledge is an essential input for ICT activities, polices to be highlighted here aim at enhancing the role of the knowledge factor to growth of the sector.

In addition to technical skills, the teaching and development of entrepreneurial and managerial skills of technical workers would help both MNEs and local SMEs to increase productivity, create more and better spin offs and startups and be better connected with the global networks in the search of business opportunities. In a fast paced sector such as ICT it may be convenient to have specific targeted workshops ("boot camps") where workers and entrepreneurs could connect and, practice these skills. This type of trainings could also be included in university curricula.

Specific measures could aim to increase access to finance, thereby helping in particular large firms in the ICT manufacturing subsectors, such as telecommunications and electronics. In general almost all investment is financed with internal resources. In many cases, having access only to this source of investment financing constraints the firm's ability to scale up the business and to engage in innovative activities such as joint research or technology transfer. Firms in the West Region are eligible for EU funding through the Operational Programs, but these instruments need to be re-designed so as to make them more attractive to firms and entrepreneurs. Particular issues to be tackled include: a) very long timeframes between application and disbursement, b) amount of paperwork, c) inflexibility to make adjustments once a project has started and d) the amount of the required co-financing which is particularly burdensome for startups. Interviews with focus groups mentioned as a main constraint for the development of the sector the lack of financing for startups and small firms. This is necessary to pay for the costs of the initial investment, and to pay wages, while allowing time to develop a good application and/or software and to generate revenue. For the type of business prevalent in the ICT sector, financing is best obtained through venture capital. The reason for this is that software companies need money upfront to experiment but other forms of financing (e.g. EU funds) may be impose requirements that are too constraining.

In addition, specific policies targeted to software startups are related to the design and implementation of the new and upcoming business incubators. It was highlighted during discussions that in order to be useful these incubators also need to provide other services, such as information about the sector and the clients, assistance in drafting business plans, and advice regarding financing options. In order to best fulfill its role, business incubators should set up and monitor specific indicators to monitor the progress of client companies to achieve graduation criteria [30] In addition, the performance of the business incubators themselves should be monitored using a clear and straightforward monitoring and evaluations system. An incubator, in its true sense, should have the objective to turn ideas into viable companies, not necessarily by providing funding, but at least by

[30] These graduation criteria include: Has the company followed their business plan? (ii) Have they added the necessary employees to meet company growth objectives? (iii) Have they developed a network of advisors and professionals (e.g., attorneys and accountants)?(iv) Have they started generating sales revenue? (v) Do they have sufficient capital to carry the company for the next six months to a year? (vi) Is the management capable of running the company without incubator guidance?

preparing the company for investment. In this respect, mentorship programs should be structured more efficiently, as the incentives for mentors have to be clear. In the past, UBIT's mentorship program was undertaken by one individual mentor. The program ceased when this person left Timisoara, showing that the initiative was not sustainable. Best practices in business incubators pair up mentors with firms based on a mutually beneficial relationship: mentors need an incentive to prepare the incubated firms for larger scale activities. Many times these incentives take the form of shareholding, or the right to take a first look at the technology that the incubated firms develop, and to subsequently participate in the ownership and management of intellectual property. Mentors also facilitate the firms' access to investors. For the ICT sector, a community to support start-ups is already in place. There are already well-established entrepreneurs that grew from the UBIT incubator, whose directors may consider mentorship activities. There are different successful models for this type of activity, some of them (such as Endeavor) which operate in different countries and could be franchised to Timisoara.

In Timisoara there are several potential investors (i.e. angel investors) interested in ICT startups, however only one such investment has materialized so far. These are experienced, skilled and well-connected individuals who could provide hands-on support to entrepreneurs. Potential investors argue that they lack knowledge on investment opportunities. Nevertheless, there is little willingness to spend time and resources researching startups. Therefore, the authorities should support and encourage the formation of a network of angel investors at the regional level but also with connections at the national and international level.

As previously discussed, there is significant potential to develop a large array of e-services at the local level, including e-health and e-administration. According to interviews with ICT firms in the region, the ICT sector in West Romania could pool expertise in order to offer an integrated services package to potential clients, such as public health institutions. However, a large share of IT firms currently work solely for foreign companies and have not developed strong linkages at the local level. The region could benefit from the existing strong expertise and cutting-edge technology of the sector. Local stakeholders could support initiatives to help match supply and demand for e-services, and help firms overcome potential administrative or legal bottlenecks (such as privacy issues related to the processing of personal data or the high number of bureaucratic procedures that have to be undertaken when working with public institutions).

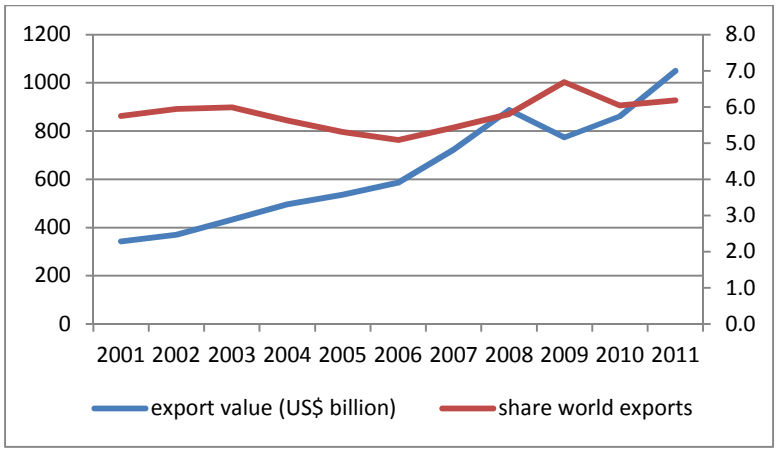
Although there is no immediate shortage of skilled labor, SMEs seem to have more difficulties in finding the skilled workforce they need. The main reason is that programming activities require "customized" training. While larger firms are connected to universities and are able to fund laboratories where they can train the workforce, this is not possible for smaller firms. Finally, regarding the linkages with global customers and with downstream user sectors, match-making mechanisms and more efforts to market the West Region ICT sector to downstream users and global customers would also be necessary.

4.4. Agro food sector

4.4.1. Sectoral overview, comparative advantages and challenges

World exports of agro-food products grew at an annualized growth rate of 11.8% between 2001 and 2011 which represented a threefold increase over the last decade. The world's agro-food exports more than doubled between 2001 and 2008 and experienced a significant decline of 13.0% in 2009 in the aftermath of the global financial crisis. However, exports rebounded in 2010 and 2011 and grew at annual growth rates of 11.4% and 22.0%, respectively. Unlike the auto and apparel/textiles sectors, agro-food products gained relative importance in the world export markets as its share of total exports increased from 5.8% in 2001 to 6.2% in 2011.

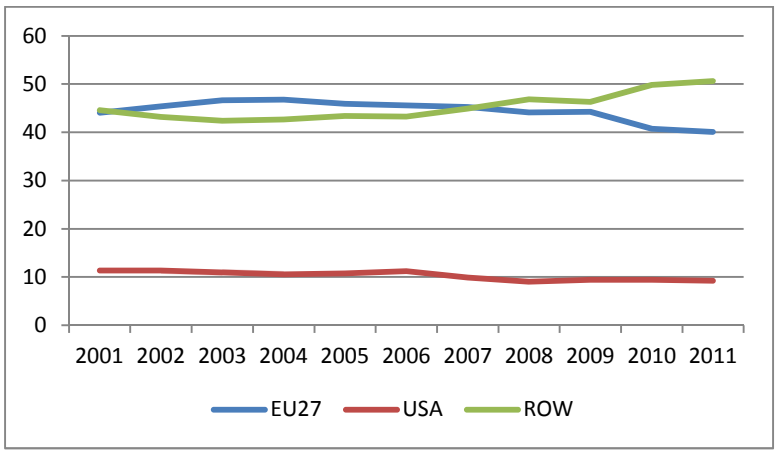
Figure 43- Agro-food sector: export value and share of total world exports



Source: World Bank staff calculation using the UN-COMTRADE database

The EU-27 is the main import destinations for agro-food products and account for 40.1% of the world's imports in 2011. The United States represents about 10% of total agro-food imports and although remains an important export destination, its importance is not as high as in other sectors.

Figure 44. Share of world's imports of agro-food sector



Source: World Bank staff calculation using the UN-COMTRADE database

In the West Region, the agro food sector - which includes food processing and the manufacture of beverages[31] - accounts for only 4.3% of the total employment in the region, or a little more than 10,000 people. In 2010 there were 199 firms involved in agro food activities, including 15 producing beverages. As a whole, the sector represents 5% of the total number of firms in the West Region; most of them are small and older than 10 years (see Table 14 below).

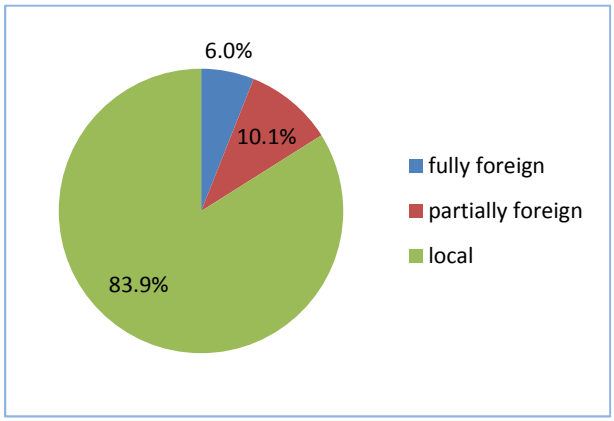
[31] SBS data – which is used for this analysis – does not provide information for agriculture neither for fishing.

Table 14- Size and age composition of agro food firms in the West region, 2010 (%. of firms)

Age	Big(>=250)	Medium (50-249)	Small (1-49)
1-5	0.7%	2.1%	7.6%
6-10	1.4%	7.6%	33.1%
+10	2.8%	22.8%	59.3%

Source: World Bank staff calculation based on SBS data

Figure 45 - Percentage of agro-food sector firms by ownership type in the West region, 2010



Source: World Bank staff calculation based on SBS data

Although the West Region is one of the most trade-dense regions in Romania, in comparison with other sectors, agro food exports represent only 0.5% of total export in the West region in 2010 (see Table 15). A reason for this is that production has been outperforming processing in recent years, while as much as 50% of production in the sector stems from low-tech activities such as processing and preserving of meat, production of cereals, legumes and oilseed and manufacture of bread (to be discussed further).

Table 15 - Dominant Sectors by Exports in the West region, 2010 (% shares)

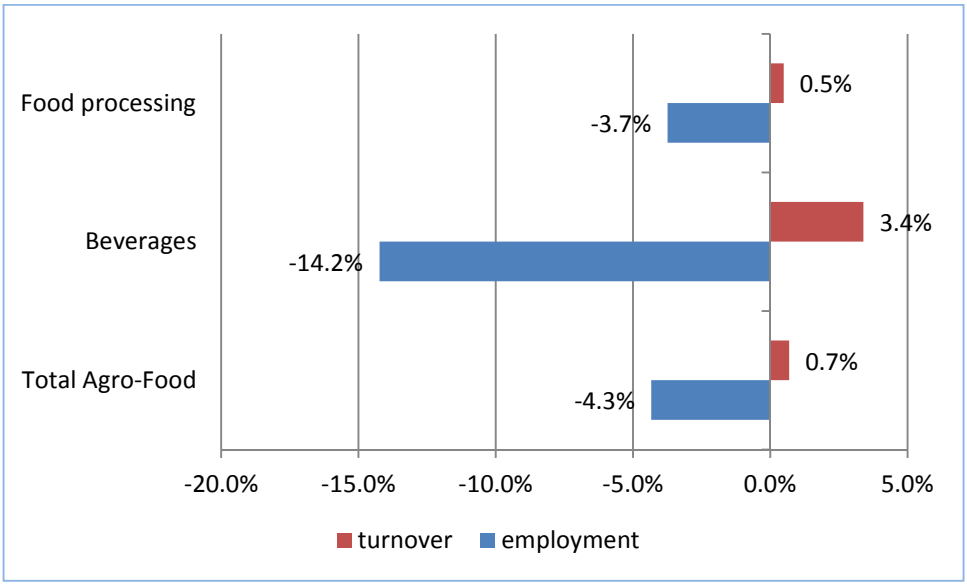
Sector/clusters	%
Auto	43.8
Textile	13.4
ICT	9.2
Construction	0.1
Agro/Food	0.5
Tourism	0.0
Energy	0.0
Health	0.0
Other	33.0

Source: World Bank staff calculation based on INS customs data

The performance of agro food firms is highly heterogeneous in the West region. While beverages activities has increased turnover in 3.4%, it has shrunk employment in 14.2% in the 2008-2010 period. In the meantime, food processing has increased less in turnover (0.5%) and decreased less in employment (-3.7%) (see Figure 46). Firm productivity dispersion is also high. As a result, in a sector with a multitude of low productivity firms, about 10 percent of high-growth firms in the region – the so-called "gazelles" (firms with at least a 25% turnover growth for 3 or more years) – belong to food processing activities, the highest percentages of gazelles across sectors in the West region (see the World Bank report "Competitiveness of West Romania Firms: Diagnostics, Challenges, and Opportunities"). The significant presence of gazelle firms in agro food activities might be one of the

reasons why the sector as a whole has been relatively resilient during the crisis. Over the 2008-2010 period, employment in this sector has declined 4.3% while turnover performance has been positive, though the increase of 0.7% was small (see Figure 46).

Figure 46 - Performance of the auto sector cluster in the West region (annual growth rate, 2008-2010)



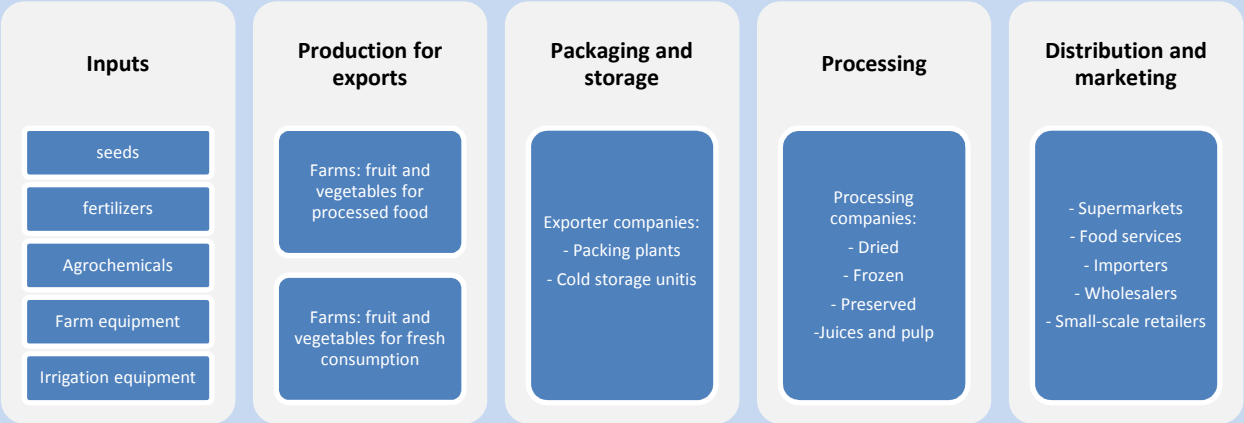
Source: World Bank staff calculation based on SBS data

Though the presence of foreign firms is not a strong feature of the agro-food sector in the region – see Figure 45– there is evidence that a number of local firms are connected to the international value chain. Table 19 presents evidence regarding the way the agro-food sector is connected to the global value chain. In the West region, there is evidence of producer-exporter vertical consolidation. This consolidation happens through (i) backward integration of exporters to production and increased dominance of large farms; (ii) contracted supply from outgrowers whereby the farmer may receive inputs, credit, technical assistance, and guaranteed sales from the exporters; and (iii) non-contracted supply from independent growers. Large farms are generally capable of producing outputs according to strict quality and traceability requirements because coordination and control are centralized in management. These large producers typically have greater access to the financial capital necessary to make the investments needed to meet these rigorous requirements. These firms have the potential to undertake other important high-value activities such as product development and innovation.

Box 4– The agro-food global value chain

The food industry, a resource based sector, is characterized by low appropriability of resources. As such, it is dominated by those countries that invest in basic and applied research (e.g. Switzerland, France, and the United States). Most innovation and value added is generated by suppliers through the creation of new machinery, new seeds, new chemicals and fertilizers, and more recently by the application of ICT to agriculture. It is also increasingly important to abide by international sanitary and quality standards, as well as intellectual property rights. A typical value chain in agro-food is described in Figure 47. This type of value chain is complex and has taken an increasingly global scale.

Figure 47 - A typical value chain in agro-food



Source: World Bank report "Trade Outcomes Assessment"

However, a large proportion of smaller agro food firms do not join the agro-food value chain in optimal conditions. Contracts can be terminated "overnight" and profit margins are too low. In addition, given the fragmented land structure of the region, the local producers of fruits and vegetables, who could supply inputs for food processing activities, are not able to produce and sell in large quantities, which limits their competitiveness and reduces their ability to join the production.

Overall, evidence suggests that the West region has a latent comparative advantage in the agro food sector. The main reasons for this inference are the low wages and, particularly, the agricultural richness of the region. With regard to the latter advantage, the World Bank report "Territorial Assessment: Profile, Performance, and Drivers of Growth" has shown evidence that the region - especially the Banat Plain, which makes up the western half of the West Region – encompasses a rich agricultural land that has supported diverse agricultural activities, including cereals, horticulture, and animal production. However, the share of the region's land area that is utilized for agriculture is the lowest among all regions in Romania.

Although land is plentiful and arable there are certain challenges which, if not addressed, may prevent the region from taking advantage of the existing potential. In this regard, particularly in the food processing and beverages activities, the main challenge in the short term seem to be increasing profitability, improving marketing, and establishing linkages with large distribution. Particularly regarding the latter, the interaction with large wholesaler chains emerges as a potentially rewarding strategy specially when considering exporting activities. In this case, it is also worth mentioning the unexploited opportunities with Serbia. Despite the fact that Belgrade is the closest major city to almost

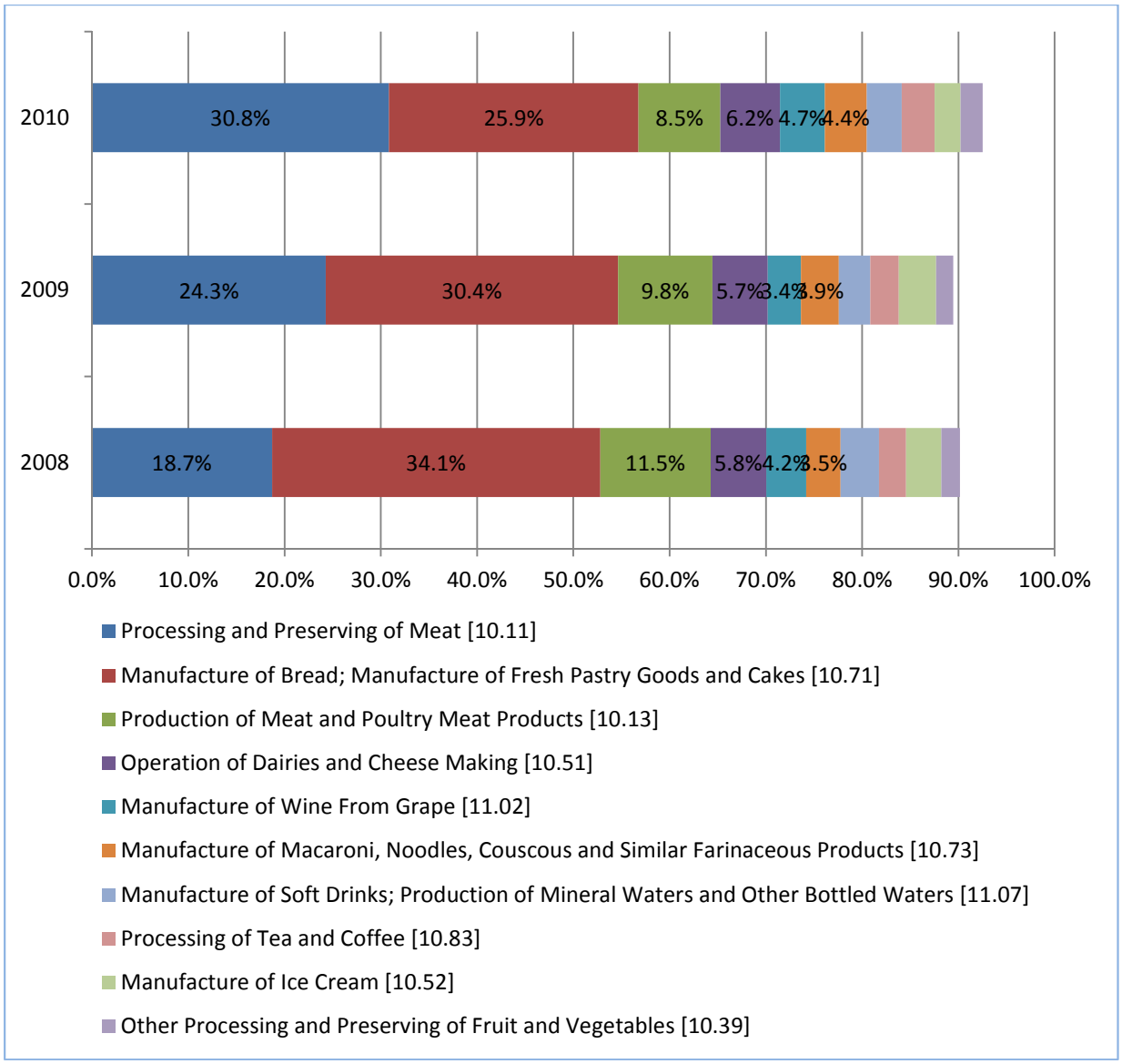
all of the West Region, Serbia ranks only 19th among the region's export destinations, accounting for just 1% of exports. Taking better advantage of opportunities for trade with Serbia, especially in agricultural products, could be particularly important for parts of Caraș-Severin that are among the most economically disadvantaged in the West Region.

Another set of challenges encompasses irrigation, lack of testing laboratories and an incipient network of storage facilities and warehouses. Irrigation is known as a major bottleneck that affects large scale crop farming at national level, particularly in light of increasing requirements for higher yields and the effects of climate change. In the West Region, consultations with agro-food producers underscored the fact that capacity to increase production is somewhat constrained by water utilities, especially in the country side and in mountainous areas, and particularly for water-intensive types of production. The lack of testing laboratories also emerges as an issue to be tackled, particularly in the case of milk production. Discussions with the private sector indicate that the local public laboratory located in Timisoara lacks testing reagents. As a consequence, complex tests have to be performed in facilities located at a considerable distance, sometimes using testing reagents provided by clients. The lack of reliable road infrastructure makes the process time consuming, which translates into higher production costs and lower competitiveness for the local producers. A number of companies in the region have invested in their own testing infrastructure but do not currently commercialize such services to other local firms. Finally, the lack of network of warehouses and storage facilities also acts as a barrier to growth in the sector. Some firms in the region own silos for depositing grains but additional investments should be considered in this area.

4.4.1. Specialization opportunities

Data shows that the value added share owned by the top 10 (NACE 4 digit) activities has slightly increased since 2008, from 90.2% to 92.5% of the all value added in the sector, while the first three activities – Processing and Preserving of Meat, Manufacture of Bread; Manufacture of Fresh Pastry Goods and Cakes and Production of Meat and Poultry Meat Products – account, on average, for 64.7% of the whole value added generated in the sector in the 2008-2010 period (see figure below).

Figure 48 - Value added share by top 10 activities (NACE 4 digit) in agro-food sector: 2008-2010



Source: World Bank staff calculation based on SBS data

By examining the annual growth performance of (labor) productivity, turnover, value added and employment, two NACE 4 digit activities emerge as high growing subsectors: Processing and Preserving of Meat, and Preserving of Fruit and Vegetables. According to Table 18, these activities have presented a productivity increase higher than average of the whole sector and simultaneously a positive performance of at least two out of the other three outcome variables. While Processing and Preserving of Meat is already the most important value added generator of the sector – accounting for 30.8% of the total – Other Processing and Preserving of Fruit and Vegetables is still an incipient source, accounting for only 2.3% of the total.

Table 16- Basic outcome performance for top 10 activities (NACE 4 digit) in agro-food sector: 2008-2010

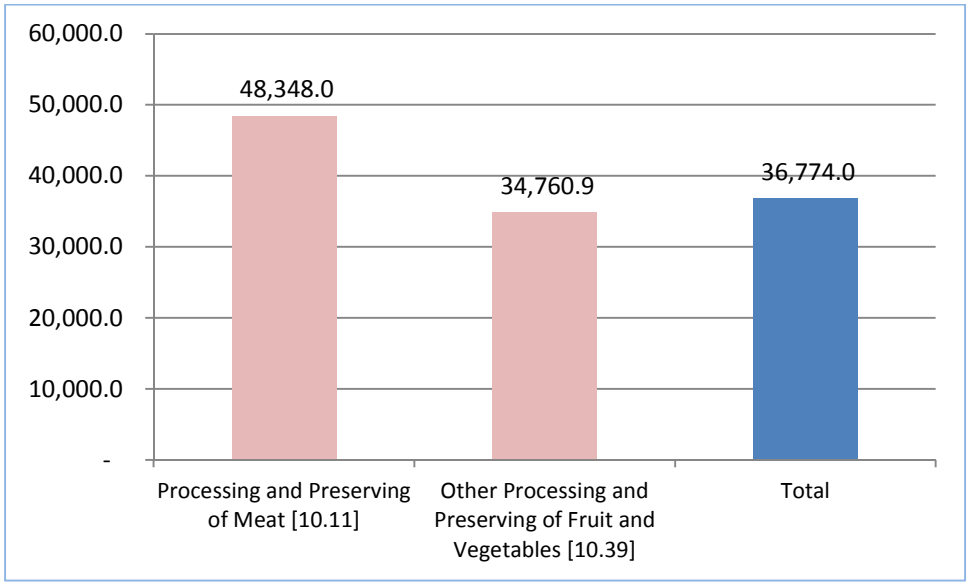
	Annual growth			
NACE4_description	**Prod**	**VA**	**Empl**	**Turn**
Processing and Preserving of Meat [10.11]	4.6%	15.3%	10.2%	13.3%
Manufacture of Bread; Manufacture of Fresh Pastry Goods and Cakes [10.71]	-6.3%	-10.9%	-4.9%	-9.7%
Production of Meat and Poultry Meat Products [10.13]	13.7%	-11.7%	-22.3%	-18.8%
Operation of Dairies and Cheese Making [10.51]	1.2%	-0.1%	-1.3%	5.3%
Manufacture of Wine From Grape [11.02]	-0.6%	1.3%	1.9%	3.6%
Manufacture of Macaroni, Noodles, Couscous and Similar Farinaceous Products [10.73]	6.0%	4.4%	-1.5%	-1.9%
Manufacture of Soft Drinks; Production of Mineral Waters and Other Bottled Waters [11.07]	0.5%	-5.5%	-5.9%	8.2%
Processing of Tea and Coffee [10.83]	-0.1%	4.0%	4.2%	7.0%
Manufacture of Ice Cream [10.52]	-22.8%	-11.6%	14.5%	2.7%
Other Processing and Preserving of Fruit and Vegetables [10.39]	7.9%	3.2%	-4.4%	5.9%
Total agro-food sector	0.5%			

Source: World Bank staff calculation based on SBS data

By analyzing the 2010 average labor productivity for these two highlighted NACE 4 digit activities, numbers suggest that Processing and Preserving of Meat has higher value added per employee than the overall agro-food sector which in fact reinforce its role as the main driver of value added growth in the future. On the other hand, average labor productivity of Other Processing and Preserving of Fruit and Vegetables is slightly inferior to the average for the whole sector, which suggests space for a potential catch up.

To the extent that exports constitute a key strategy for the sector's expansion, and given the increasingly "buyer-driven" environment of the global value chain, the further development of specialization opportunities highlighted in this section, and actually of the whole agro-food sector, depends on upgrading processing, packaging, quality, and branding. Particularly essential is also establishing linkages with large distribution networks; this important especially for the producers from lagging counties that tend to specialize in agro-food products like vegetables.

Figure 49 - Average labor productivity for selected NACE 4 digit sectors within textile sector: 2010 (Romanian Lei per worker)



Source: World Bank staff calculation based on SBS data

Despite the dominance of the processed meat and manufactured baked/pastry products in the agro-food sector in the West Region (Figure 48), exports are dominated by cereals and oil seed products like maize (HS 100590), sunflower seeds (HS 120600), rape seeds (HS 120500), and wheat (HS 100190), which accounted for about half of agro-food exports in 2011. In fact, the two most important animal export products are not processed meats but live animals (bovines and sheep) and no baking or pastry products were among the top 20 agro-food sector exports in 2011. This suggest that the dominant agro-food activities in the West Region see the local market (Romania) as their main target; other activities in this sub-sector, like processed/preserved fruits & vegetables and wine, are more reliant on international markets for their exports. There are some promising export products among these agro-food activities like walnuts (HS 80232), mushrooms (HS 70951), apples (HS 800810), and grapefruit (HS 80540), which represented 6.2%, 0.8%, 0.2% and 0.1% of agro-food exports in 2011, respectively. Additionally, wine exports (HS 220421) represented 1.3% of exports from this sector in 2011. The presence of important export products from the processed/preserved fruit and vegetable activity, and the fact that this activity presents some room for productivity increases (Figure 49), suggest that there might be opportunities to increase output and exports in the sector in the near future.

4.4.3. R&D activity, linkages with RTDI supply and connections with global networks: how does it relate to specialization in the sector?

Table 17 presents the specialization pattern of the agro-food sector in the West Region. Unlike in the case of the auto and textiles/apparel value chains, the West Region shows some specialization in more than one segment of the export value chain. Both the Final products and Raw Materials segments have been important in terms of exports for the West Region, although the former has traditionally represented the bulk of the activity in the industry. Table 18 presents the breakdown of the top five exported products by segment in the agro-food value chain in the West Region.

Table 17. How the West region is connected to the agro-food value chain: exports in the agro-food sector by stage of production (% sector exports in 2011)

Value chain stage/segment	2005	2006	2007	2008	2009	2010	2011
Final products	8.2	29.2	17.8	23.0	28.8	20.2	20.8
Main parts and components	10.2	5.3	13.9	10.0	3.7	5.6	6.0
Raw Material	70.9	49.4	52.5	50.8	56.8	66.6	67.1

Source: World Bank staff elaboration based on INS customs level data

Table 18: Top exported products in the agro-Food value chain, by stage of production

Stage/Segment	HS code	Product	% segment exports	% sector exports	rank
Final products	170199	Cane or beet sugar, in solid form, nes	25.0	5.2	1
Final products	160590	Molluscs and other aquatic invertebrates, prepa	21.6	4.5	2
Final products	220421	Wine (not sparkling); grape must with by alcoho	12.6	2.6	3
Final products	210110	Extracts, essences, concentrates and preparatio	8.6	1.8	4
Final products	190530	Sweet biscuits; waffles and wafers	5.9	1.2	5
Main parts and components	40210	Milk and cream in solid forms of =<1.5% fat	53.0	3.2	1
Main parts and components	230110	Flours, meats and pellets, of meat unfit for hu	19.5	1.2	2
Main parts and components	40500	Butter and other fats and oils derived from mil	10.7	0.6	3
Main parts and components	40221	Milk and cream in solid forms of >1.5% fat, uns	6.7	0.4	4
Main parts and components	230640	Oil-cake and other solid residues of rape or co	2.5	0.2	5
Raw Material	100590	Maize (excl. seed)	47.6	32.0	1
Raw Material	80232	Walnuts without shells, fresh or dried	18.2	12.2	2
Raw Material	100190	Spelt, common wheat and meslin	15.0	10.1	3
Raw Material	120100	Soya beans	2.9	2.0	4
Raw Material	70951	Mushrooms, fresh or chilled	2.2	1.5	5

Source: World Bank staff elaboration based on INS customs level data

The complex – and increasingly global – features of the agro food value chain (see Box 4), and more importantly the particular way the local firms were able to join the international chain – either by producing final products or mainly through the export of raw materials - brings clear consequences on the local R&D activities in the sector. As mentioned previously, the largest share of innovation (and value added) in the agro food value chain is generated by buyers through the provision of new machinery, new seeds, new chemicals and fertilizers, and more recently by the application of ICT to agriculture. In many cases large buyers, both foreign and local, serve as channels for technology upgrading and standards compliance. Firm interviews conducted as part of this analysis revealed that R&D is a marginal preoccupation for the majority of firms in the agro food sector in the region. Even those companies that are willing to collaborate with universities show a general distrust in the capacity of these institutions to conduct applied research, and previous collaboration attempts have so far been timid and unsuccessful. However, the collaboration with research institutes is important as these have a role to play in disseminating technologies, testing and adapting seeds to local conditions, preserving

local varieties, and seed testing in order to identify higher crop yields. Given that food engineering, agriculture, and veterinary sciences are areas of strength of the West Region universities, public policy should encourage innovation in the agro-food sector.

While the role of universities is also to provide extension services, in the West region these services have being introduced only recently. However, more formal, streamlined practices could be developed since the majority of contracts are between firms and individual professors. Therefore the key questions are: i) how to encourage the development of institutional extension services if professor salaries are capped to university standards; and ii) how to organize the firms operating in the sector in an association that identifies sectoral needs and niches for university-firm collaboration.

In this context, there is evidence of some interaction between the research community and the private actors. The Banat's University of Agriculture and Veterinary Medicine specializes in the area, and this gives the West Region a comparative advantage in terms of knowledge accumulation and expertise. The Aurel Vlaicu food engineering department also has a related research agenda, with an EPO patent filing in a functional food application. Given the low number of EPO and USPTO patent applications in the region, the effort is commendable and should be supported. There is, however, a disconnect between private sector practices and the university expertise, as the private sector believes that the universities are slow in adapting to the new agricultural techniques. Partly, the problem is one about communication and awareness-raising among the private actors about the research undertaken at the universities and partly, it is true that the university remains relatively methodical to be able to meet the private sector's ever changing demands. At this point, the private sector may be encouraged to lead the collaboration with the universities for a demand driven research agenda.

4.4.3. An evaluation of the horizontal constraints that affect the sector

Transport infrastructure

There is a lack of highways and the existing road infrastructure has poor quality. While the connection to EU highways in Romanian western border is important for exporting firms, the local/national distributors face difficulties for delivering to the national retailer networks. Nevertheless, roads used for local distribution (i.e. network Resita-Timisoara-Arad-Oradea-Satu Mare) have drastically improved recently.

Moreover, energy fluctuation is a problem for most firms and this constitutes major risk for the food processing industry where cooling storage facilities are important. Therefore several firms have invested in the purchase of own power generating equipment so as to mitigate suck risks. In addition, water utilities are problematic in the country side and mountain areas, reducing water availability. Irrigation is a national issue that affects large scale crop farming and is perceived as a major for the future, considering requirements for higher yields necessity and the effects of climate change.

Skills and training

The sector requires technical staff that can enter rapidly into production but most new workers need training for at least 6 months. The workforce needs to be geographically mobile because most businesses are in rural areas that are not particularly attractive. Agronomy engineers trained in Timisoara are well-regarded and, while the availability of unskilled workers is not an issue in general (as the firms are remote – thus lack of choice towards urban life and no other industries are preponderant), their retention is difficult and seasonal turnover is a given, since most of them can go abroad for seasonal work.

Standards, quality and certification

Quality standards are imposed by the major retailers and for EU exports. Exporting firms have the necessary certification requested by EU regulations for internal market and exports. In the case of suppliers, the food processing activity also requires certification of raw materials and it appears that, apart for the companies with integrated value chain, there is mistrust regarding smaller local suppliers in terms of quality certification, especially for meat production where the black market is a serious problem. State controls on the quality are too numerous and from different local agencies. There were no particular complaints about access to state testing labs, apart from the milk testing which is done outside the region and takes too much time.

Financing / use of EU funds

Most companies in the sector access funding from their own internal sources (reinvested profits). Bank credit lines and EU funds are minimal on average. The interest rate is generally perceived as high. Those that have accessed EU funds have used it for new production lines, plants, machinery, testing labs. The collateral required by EU funded programs makes them inaccessible for small producers. Moreover, EU funds rules are very bureaucratic, and do not provide for flexible implementation. All the large companies interviewed as part of this study benefited from EU funds.

4.4.4. Prospects for sectoral development and considerations for policy actions

Firm-level data analysis has pointed some NACE 4 digit sectors as - Processing and Preserving of Meat, Manufacture of Bread and Other Processing and Preserving of Fruit and Vegetables – as potential opportunities for further specialization. Given the complex – and increasingly global – features of the agro food value chain where the largest share of innovation (and value added) is generated by buyers, the only way local agro-food companies have to grow is by upgrading processing, packaging, quality and branding. In this context, value-adding activities range from sorting, cleaning, and packaging to processing, branding, and retailing. Value can often be captured through relatively simple changes, such as canning, drying fruit, cooling milk, packaging, and even labeling. Particularly essential is also establishing linkages with large distribution networks; this important especially for the producers from lagging counties that tend to specialize in agro-food products like vegetables. In this regard, anecdotal evidence from focus groups presented in the World Bank report "Trade Outcomes Assessment" suggests that the small scale of some agro-food producers and lack of consolidation could be hampering further export growth. In this way, fostering better linkages with a wholesale market may therefore represent a solution in the short term.[32] Also important to enhance the competitiveness of the agro-food sector in the region is to expand both the testing laboratories for the food industry at the local level as well as the network of storage facilities and warehouses could help to.

In a sector characterized by a large presence of SMEs, the agro food activities in the West Region could benefit from targeted initiatives for SMEs. In this regard, it is worth emphasizing the need to develop the infrastructure to help agro food producers meet the quality certifications required for their specific products and comply with health and safety standards. According to focus groups discussions carried out as part of this analysis, problems exist in all these areas. One main obstacle faced by local producers who wish to become suppliers for large distribution chains appears to be the need to ensure quality and health standards that, according to focus group interviews, small firms are not

[32] The same report shows evidence that in some sectors like agro-food, the use of wholesaler as intermediaries of foreign trade is linked to improved quality and successful entry into export market.

always able to meet. Moreover, the costs for complying with food and safety standards are high. There is only one accredited food safety and veterinary agency in Romania which is located in Bucharest. Performing tests takes 10 days. Here, the development of a regional food safety laboratory facility would speed up and streamline compliance with requirements.

Other initiatives targeting SMEs would be also useful such as: SMEs financing initiatives, marketing initiatives such as the development of a regional brand, and provision of training in marketing, sales, etc. Agro food SMEs have significant difficulties in accessing financing. For example, financing may help local suppliers to access large retail chains. Some retailers require suppliers of food to co-finance shelve space in supermarkets, a costly activity that small firms may not have the financial resources to undertake. Additionally, public initiatives to offer courses in marketing, sales, brand management and value added production may help local firms. In particular marketing support for small and medium sized firms as well as training and consulting services to help build capacity in the sector could be very helpful in enhancing the competitiveness of West Region food producers.

In addition to targeted SMEs policies, investment in basic and applied research should be supported, as this kind of investment will also be necessary to increase competitiveness in the sector. Due to the fact that food engineering, agriculture, and veterinary sciences are areas of strength of the West Region universities, public policy should support innovation in the agro-food sector. Already, an encouraging initiative is the collaboration between the University of Banat and the private sector in the field of agriculture extension services, which was initiated with a contribution from the Word Bank MAKIS project funding in 2008. Input systems must be backed by a dynamic research system. To the extent that R&D efforts should involve public financing, because of the public good nature of most R&D products, collective action by industry associations to implement a small levy on production offers a promising method to finance R&D for the commercial agriculture products.

Market-orientation and funding eligibility of most agricultural holdings are restricted. The Romanian agricultural sector does not fully utilize its widely recognized agro-climatic potential, as it continues to be dominated in number by miniaturized (semi-) subsistence holdings with limited market orientation and eligibility for CAP funding.[33] Thus association of small scale farmers could greatly improve access to finance, production sustainability for food processors, lower food processing costs and help to provide more robust employment in rural areas.

Land consolidation, as well as the development of the land market is required. The still uncompleted land and property reform and development of the land market continues to limit access to credit and other rural financing options, and has delayed the restructuring of farms in accordance with market demand and the need to enhance competitiveness.[34]

Exploring cross sectorial links with ICT can also work as a potential channel to increase value added. In this regard, the case of Denmark – which established and maintained the position of top eight world exporter of food products through applying massively ICT technology to the production and processing of food – can work as an emblematic example. For the West region, the further use of ICT facilities depends on coordinated efforts and a policy to support the local development of software solutions is a key element.

[33] http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2007/11/07/000020953_20071107100638/Rendered/PDF/40998010RO.pdf

[34] ibidem

4.5. Construction Cluster

4.5.1. Sectoral overview, comparative advantages, challenges and specialization opportunities

In its communication An Integrated Industrial Policy for the Globalization Era[35], the European Commission emphasizes that the "EU industry must speed up its transition to the low-carbon, resource- and energy-efficient economy. Combating climate change and increasing resource efficiency can achieve cost reductions and reduced environmental impact from enhanced resource and energy use. These are increasingly essential both to deliver sustainable growth and jobs and to gain competitive advantage in response to increasing global competition for resource and environmental constraints."

The communication also notes specifically that:

> *"the construction sector can […] make a substantial contribution to responding to climate change and other environmental and societal changes. The revised Directive on energy performance in buildings sets the ambition of the transition to nearly zero energy buildings in Europe as of 2021, whilst the reinforcement of the energy performance requirements will set new standards for buildings. This is an opportunity for the construction and renovation sector."*

Construction is typically classified as a pro-cyclical economic activity. Following a global trend, the industry has been severely impacted by the economic crisis; many construction firms in the West Region of Romania have seen their rates of activity decrease steadily since 2008, beginning with the onset of the economic crisis that swept over Europe and Romania. Analysis of firm-level data from the National Institute of Statistics indicates that, between 2008 and 2010, West Region firms in the construction sector experienced a 23% decrease in employment 12% decrease in turnover, on average (see Table 1).

Despite adequate levels of expertise regarding the use of technologically-advanced construction materials (particularly in the Timisoara area), there is not sufficient evidence to indicate that the West Region holds significant natural or knowledge assets in construction, though the availability of construction materials (such as stone, wood or marble) at the local level can help support the development of the sector in the future.. For this reason, the West Region can be classified as having **an unclear specialization or an unknown comparative advantage** in the construction sector.

In this context, there are certain opportunities and challenges that need to be considered in order help the sector develop through entrepreneurship and "self-discovery" while promoting the use of resource efficient technologies.

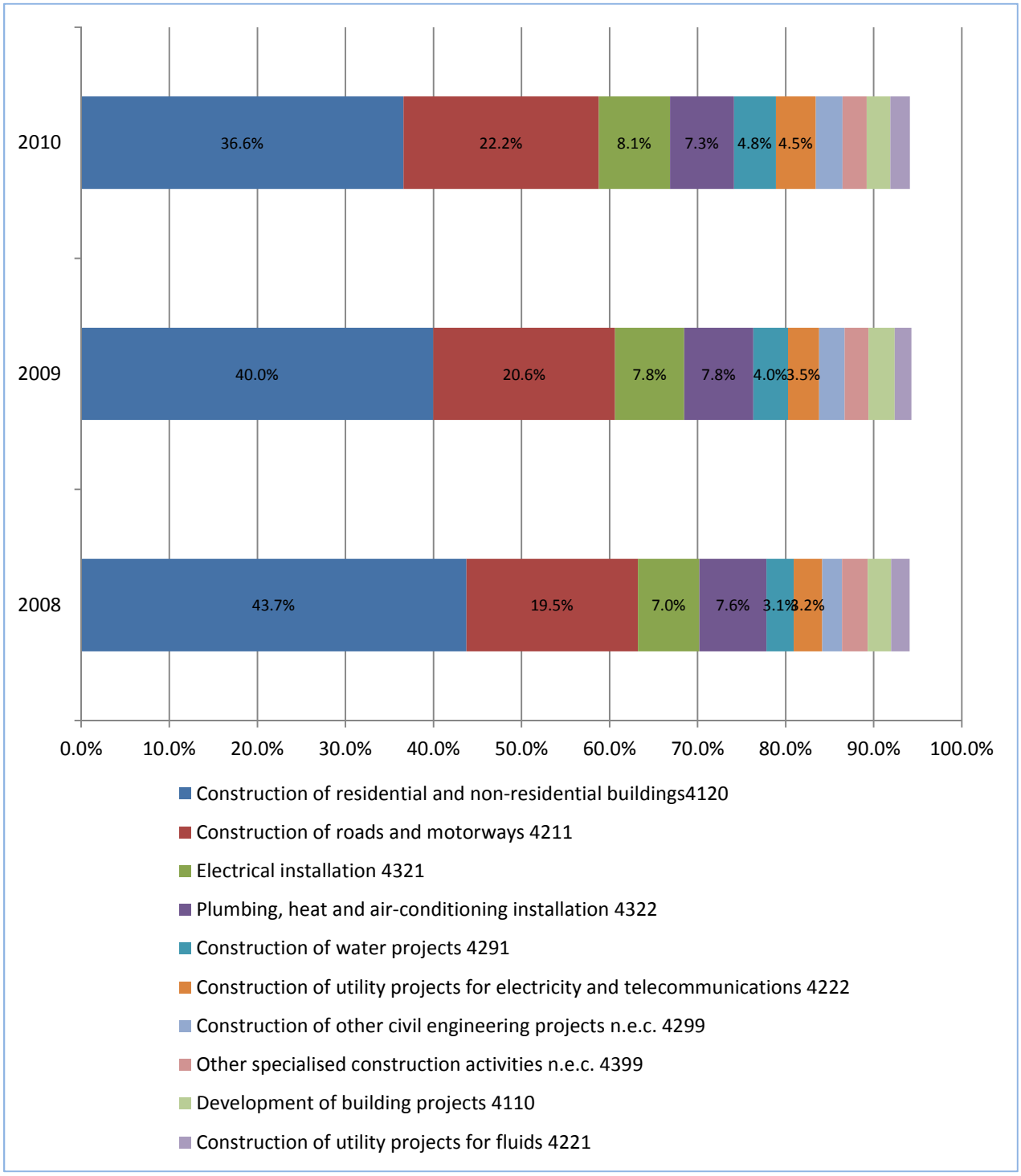
First, due to continuous increases in energy prices, the use of energy-efficient materials will become a requirement for medium and long-term economic sustainability. Nevertheless, the use of this type of materials by construction companies in the West Region is still highly dependent on the client market. Discussions with sector stakeholders indicate that many firms, particularly in the Timisoara area, have access to the necessary skills, know-how and inputs that would allow them to use this type of materials, if the demand existed.

Existing data about the value added structure of the construction sector shows that the value added share owned by the top 10 (NACE 4 digit) activities has been constant, around 94%, while the first two activities – Construction of residential and non-residential buildings, and Construction of roads and motorways – account, on average, for 63% of the whole value added generated in the sector in the

[35] Brussels, COM(2010) 614

2008-2010 period (see figure below). Since these are essentially traditional activities and the firm-level data do not provide information about the type of materials that are used in these processes, there is need to assess the available options in terms of energy efficient construction inputs.

Figure 50 - Value added share by top 10 activities (NACE 4 digit) in construction sector: 2008-2010



Source: World Bank staff calculation based on SBS data

Residential and non-residential construction should aim to meet the EU Directives on energy consumption, air conditioning, heating, environmental standards, building, thermal insulation and energy saving. As the necessary materials and technology are available in the market, their effective use will depend more on the incentives of the construction firms. In this regard, it is worth emphasizing that as private investment has continued to decline, construction firms have become increasingly reliant on government contracts as their main source of revenue. If the client is the government, which has often been the case in recent years, the use of energy-efficient inputs can be restricted if these materials or installations are more expensive than the average inputs. As a result of shrinking government budgets, procurement contracts have been assigned lately based overwhelmingly on the lowest-price criteria, to the detriment of technical and energy performance requirements. Regarding other types of clients (private sector companies), these can constitute a type of market that is better able to absorb high quality materials. It should be emphasized that such investments, including supermarkets, office buildings, or hotels are also dependent on the general business prospects of the region. Lastly, a third category of users of energy efficient construction materials are private residencies. As the West Region become better-off economically, households will be better able to invest in energy efficient materials.

4.5.2 R&D activity, linkages with RTDI supply and connections with global networks: how does it relate to specialization in the sector?

Most of the construction companies in the West Region adapt the existing off-the-shelf technology to the specific needs of their projects or clients, but do not have an organized R&D division. It is expensive to conduct research and the availability of capital for this type of activities constitutes a major obstacle for local firms. However, some companies manage to engage in small research projects. Such projects include: developing a new construction material for thermal rehabilitation, production of photovoltaic cells and panels, design of a prototype for a new steel door. Part of these projects are conducted in collaboration with Politehnica University and the companies which undertake this type of research are located mainly in the Timisoara area, where they have access to higher levels of technical expertise than in other counties in the region, and where they can collaborate more easily with university students and teaching staff. These projects sometimes start from the company's attempt to better meet the needs of its clients or are prompted by observation of trends at international fairs.

Against this background, it is also worth mentioning the role of the National RDI for Construction, City Planning and Sustainable Territorial Development (URBAN INCERC). The human resource capacity of the local branch of the URBAN INCERC has been declining due to funding constraints, and this has had an adverse effect on the RDI's research capacity. INCERC's main source of income is now the testing and calibration activities, and with support, capacity may be increased to resume the research activities, which may focus on smart buildings for energy efficiency.

The availability of financing is essential for the development of research activities. Some construction companies in the West Region have lost their investments in innovation projects. For example one firm mentioned that it has tried to develop and produce a new type of LED light bulbs but the project failed because the Romanian company could not compete with Chinese producers.

The machinery and equipment used by construction companies in the West Region is imported to a large extent primarily from Germany, Spain, Italy, or the Czech Republic. According to interviews with firms in this sector, the technology required to produce this type of equipment is not available in Romania. Some of the materials used are also imported (even though they may be purchased from companies based in Romania).

A local organization which has the potential to catalyze research efforts in the field of energy efficiency is ROSENC - a Romanian NGO organized as a cluster association of firms and industry, research organizations and public institutions, which aims to promote renewable energy sources, energy efficiency, and new sustainable energy sources within the West Region and across Romania.

One of the most important functions that ROSENC fulfills is that it focuses on providing the necessary, and often but missing, incentives for collaboration. For instance, in order to develop a project to produce solar panels the cluster created a new enterprise to overcome firms' reluctance to conduct joint research or invest resources with other firms, fearing some of the companies involved could free ride. The solution implemented by ROSENC was to create a new company in which all involved parties became shareholders. In this manner all stakeholders, including university professors, could have an incentive to bring the project to the commercialization phase.

The leadership of ROSENC approaches each project with a comprehensive look at the value chain in order to identify the missing links that can be provided in the region, how the work can be organized among its members, and the parts of the supply chain that must be strengthened in order to improve a project's chances of success. For example, for a project focused on poles of competitiveness, ROSENC mapped the entire value chain and found that the missing link was the photovoltaic r cells, which were not produced in the region. As a result of this analysis ROSENC proposed a project to finance a factory that can manufacture the missing component. In the future, ROSENC could play a key role in the West Region for mobilizing existing know-how and promoting collaboration which can materialize in innovative and marketable solutions for energy efficiency.

4.5.3. An evaluation of the horizontal constraints that affect the sector

Access to external finance

Apart from the use of internal funding, the acquisition of machinery, equipment and supplies by construction companies in the West Region is mainly financed through bank loans. Some firms mention that credit is difficult to obtain due to the large amount of collateral required and high interest rates, compared to requirements in other European countries. In this context, EU Funds are important for construction companies in the West Region via two main channels: i) projects for which the companies can apply (and which are focused on technology development and research, sometimes in collaboration with Politehnica University, and upgrade of in-house technology and equipment); and ii) large scale development projects financed by European Structural Funds in which construction companies can participate via government contracts.

At the individual firm-level, construction companies in the West Region have used European Funds during the 2007-2013 financing phase and plan to also apply for this type of financing in the upcoming programming period (2014-2020). However, some stakeholders mention that the procedures required to access these funds are not transparent. In some cases national or local authorities impose additional requirements which make the process slow and cumbersome. Long delays in project approval can render a particular technology (the end-use of the funds) obsolete. As a result, these delays can make the company that is waiting for funding to lose competitiveness.

Skills and training

Companies (especially in Timisoara) can usually find qualified labor force, although they complain that many graduates, in fields such as engineering, do not have sufficient practical (and sometimes theoretical) skills. Proximity to Politehnica University is essential for companies that wish to

recruit interns, collaborate on research and product development, or provide technical training for staff. Small or medium-sized firms face wage competition from multinational companies and can sometimes invest in training for highly-skilled employees who choose to leave soon after they acquire better qualifications. The economic crisis had alleviated some of the pressure on labor availability. Outside of Timisoara or Arad it is more difficult for companies to attract and retain high-skilled labor who can perform high value added design and research activities, as the less developed counties like Caras Severin and Hunedoara provide fewer opportunities and lower living standards than the more developed areas of the West Region.

The scarcity of vocational schools and reduced interest in this type of training has had a significant negative impact on the availability of skilled labor (technicians, masons, electricians, etc). The courses offered by unemployment agencies fail to provide blue collar and unskilled workers with the necessary abilities. Companies train the workers in-house or contract specialized training if they have the financial means or the opportunity to do so (ex: worker training programs sponsored by German funding). Worker turnover is also a problem for unskilled labor (people used to leave to Western Europe) but the trend has been reversed with the onset of the economic crisis.

Transport Infrastructure

The general perception is that the local roads and the quality of the infrastructure have degraded due to lack of investments. Companies have usually managed to adapt to the situation but they are affected by the state of the road infrastructure to various degrees. Firms that use their own trucks for transport complain most stringently, as this leads to vehicle depreciation, delays and loss of competitiveness. The most pressing issues are the general poor quality of the roads in the region and the lack of a ring road for Timisoara.

Legal framework

Changes in legislation occur often and are unpredictable. This concerns both horizontal regulation (tax code or labor code) as well as sector-specific legislation concerning the rules for renewable energy. For example, uncertainty related to the distribution of 'green certificates' can derail a company's business plan.

According to discussions with private sector stakeholders, litigation procedures can be very lengthy, which has a negative impact on business operations. . Consultations with firms suggest that contract enforcement procedures could be streamlined, and some stakeholders have suggested using arbitrage procedures in order to resolve legal disputes in a more efficient manner.

4.5.4. Prospects for sectoral development and considerations for policy actions

Construction firms in the West Region are still trying to recover from the global and national economic downturn, which has had a particularly severe impact on this sector. In addition, there is very little information to indicate whether or not the region will succeed to build a significant comparative advantage in construction in the medium term. As Correa and Guceri (2013) argue in their study, in this type of situation the authorities ought to prioritize horizontal policies, which will create a business environment that is conducive to entrepreneurship and "self-discovery". This approach can facilitate firm entry and exit, access to finance, and the accumulation of knowledge.

Discussions with construction firms and stakeholders in the West Region, which were interviewed as part of this report, have also highlighted labor skills, and infrastructure as horizontal

policy areas that need to be addressed in order to support business development, both in construction and on an economy-wide level.

In this regard, the expansion and improvement of the vocational school system is essential in raising and maintaining the competitiveness of the construction sector in the West Region. Currently, the scarcity of qualified technicians including electricians or middle-skilled workers such as masons affects the ability of firms to grow and may increases wage pressures for these professions. The curriculum should be established in close collaboration with the private sector, ensuring that graduates possess a set of skills which is in line with market demands.

All firms interviewed as part of this report mentioned that they have used European Funds, either by applying for a particular project or through a government contract financed by structural funds. However, in order to improve access to this key type of financing, it is critical that authorities increase the overall level of transparency regarding access to EU Funds and that application and payment disbursement procedures are streamlined and simplified.

For firms which use their own vehicles for transportation, the quality of the local road infrastructure can affect the ability to send and receive materials in a timely manner and may increase costs in terms of vehicle depreciation. In this turn, improving the quality of internal roads in the West Region and the connectivity with the highway is essential in order to enhance the competitiveness of firms in the sector.

Nevertheless, there are additional sector-specific issues that could be tackled to help increase the competitiveness of construction firms; two important issues can be highlighted: i) knowledge exchange and R&D cooperation; and ii) modification of selection criteria used in state auctions for infrastructure projects.

The West Region cluster ROSENC can play a key role in promoting collaboration between state authorities, academia, and the private sector in order to increase the level of local technical expertise regarding the use of resource efficient materials. It can also, in the medium and long term, support commercially sustainable projects in order to expand the production of energy efficient construction materials and appliances in the region, which could help reduce the cost of such inputs and increase their use in local infrastructure. Increasing awareness regarding ROSENC's initiatives would encourage knowledge exchange and would help local firms to increase competitiveness and to become better connected to the latest technological developments in the field.

Discussions with construction firms in the West Region suggest that over the past few years, government infrastructure contracts have been awarded primarily according to the *lowest price technically acceptable* criteria. This evaluation method can exclude project proposals that rely on the use of high-quality energy efficient materials, as this type of inputs and appliances is more expensive than regular materials. However, studies[36] have shown that 'green buildings', although more costly to build, provide a good return on investment due to significant savings in energy costs over the life-cycle of the structure. In this context, the authorities should encourage the use of energy-efficient materials and should support the transition to nearly zero energy buildings. These measures would promote the use of energy efficient materials while helping sustain long term economic development.

[36].See, for instance, Kats et al (2003), Langdon (2007) and Fuerst et al (2008).

4.6. Tourism Cluster

4.6.1. Sectoral overview, comparative advantages, challenges and specialization opportunities

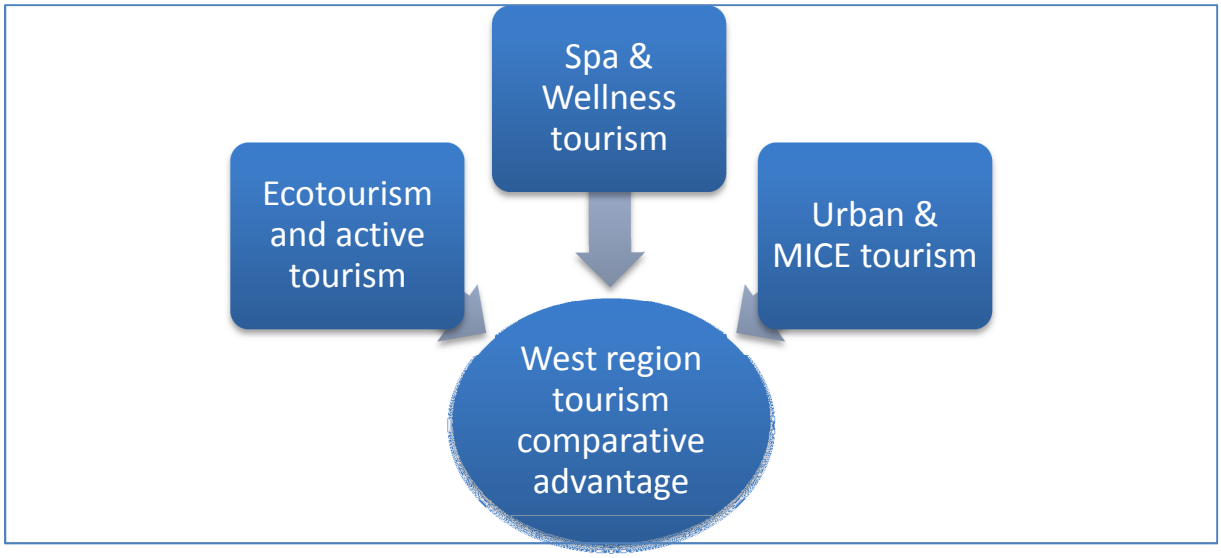
The characteristics of the tourism sector make it a key sector for promoting the smart, sustainable and inclusive growth that Europe 2020 aims to foster. This is acknowledged within the strategy itself, which lists the enhancement of the competitiveness of the European tourism sector as one of its priorities within the framework of the flagship initiative "An industrial policy for the globalization era".

There are three basic characteristics that position the tourism sector at the center of the Europe 2020 strategy:

- Tourism is the third most important socioeconomic activity in the EU after the trade and distribution sector and the construction sector. The sector generates more than 5% of GDP of the European economy and employs 5.2% of the workforce. When those sectors related to tourism are taken into account, these percentages increase to 10% and 12%, respectively.
- Tourism is one of the economic activities with the greatest potential for creating growth and employment in the EU. In recent years it has not only created employment at a higher rate than average within the economy, but it has also generated more employment opportunities for young people, women and unskilled workers. This is illustrated by the fact that the proportion of young people working in the tourism sector is double that of the rest of the economy, for the EU as whole.
- The tourism sector is essential to fostering territorial cohesion within the EU, particularly in terms of encouraging the economic and social integration of rural and mountain areas, coastal regions and islands, peripheral and ultra-peripheral regions and less prosperous regions.

In the case of the West region, the different types of tourism that form the comparative advantage of the tourism sector are detailed below.

Figure 51 - Types of Tourism in the West Region



Eco tourism and active tourism

One of the main assets of the West Region is its important natural heritage resource: mountainous landscapes, gorges, lakes, hot and mineral springs, nature parks and reserves. Approximately 26% of all Romanian protected areas are located in the West Region. These protected areas are part of the Natura 2000 network. The West Region main national and natural parks cover an area of about 4,461 square kilometers, which represents 13.4% of the West Region's land area. Boxes 5 and 6 present a detailed description of these parks. Besides these parks, the Danube River – which represents the border of Caras-Severin county and the national Romanian border with Serbia – is another important advantage with potential to become a significant touristic asset for the West Region.

Box 5 - National Parks in West region

Cheile Nerei – Beușnița is situated in the southwest part of the region, in the southern part of the Anina Mountains along the Nera River. A very diverse flora has developed here, particularly Balkan, Mediterranean and Sub-Mediterranean species and a very impressive karst landscape with caves, sinkholes, outbursts, and waterfalls.

The National Park Cheile Carasului-Semenic is located in the central part of Caras-Severin county, covering an area of 36,364 ha including 10 declared reserves and 8 proposed reserves. The sculptural aspect of its limestone formations gives a particular beauty to "Cheile Carasului". Karst landscapes are also predominant, including caves, pitches, sinkholes and lapis.

The National Park Domogled - Valea Cernei is the second largest in the country and the only one that includes an entire river basin and several mountain massifs. Domogled is located near Baile Herculane, and is considered as one of the richest reserves in terms of plant species in Europe. Within its territory, all three types of ecosystems present in Romania can be found: water, land and underground aquatic ecosystem.

The National Park Retezat represents the most complex scientific reserve in Romania and its importance is recognized by international organizations such as UNESCO, which have included the Retezat Park in the Biosphere Nature Reserves list. The park covers 20,000 ha including glacial relief (many basins, valleys and glacial lakes), rare plant (mountain orchid, edelweiss, wild walnut) and valuable specimens of fauna.

The National Park Defileul Jiului hosts many wildlife species, especially birds that "pass through" this "Central European - Bulgarian path", one of Europe major bird migration corridor.

Box 6 - Natural Parks in West region

The Natural Park Lunca Mureșului is located in the West part of the region, in Arad and Timiș counties. It stretches from Arad to the Hungarian border, along the river Mureș. The park is a typical wetland ecosystem of river and backwaters. It is also an important nesting place for approx. 200 species of birds.

The Natural Park Portile de Fier is located in between the South West and the West Regions, stretching over an area of 115 655 ha. The park contains a total of 18 protected areas with two protected bird areas. It is part of the Natura 2000 network.

The Natural Park Grădiștea Muncelului-Cioclovina is a protected area of national interest (IUCN 5th category) situated in the Southern Carpathians Sureanu Mountains. The main touristic attractions are natural Karst and archaeological sites such as the Prehistoric painted cave of Cioclovina and the UNESCO Heritage Site of the Dacia Fortresses Sarmizegetusa Regia.

The Dendrologic Park Bazoș is a forest reservation situated about 15 kilometres from Timisoara, which benefits from a sub-Mediterranean climate Eight hundred different species of trees and shrubs from all over the world can be found there, some of them unique in the country.

In terms of historical and architectural heritage, in 2010, 2,104 monuments and historical sites located in the West region were registered on the Romanian national list of Historical Monuments.

In Arad county, the main cultural heritage assets are historical sights and cities, more than 20 castles, monasteries and churches, ethnographic centres and rural heritage sights. The Arad County is well known for medieval fortresses such as Arad Vauban, Siria, Dezna, Soimos:

In Caras-Severin county, the main cultural heritage assets are of archaeological nature: Geto-Dacian sites (Bocşa, Colţan, Ocna de Fier, Oraviţa, Sasca Montană, etc.), Roman military architecture (Varadi, Mehadia, Teregova, Moldova Veche, etc.), medieval fortresses (Caraşova, Mehadia, Coronini, Caransebes, etc.), historical and religious monuments (monasteries, wood churches), historical monuments and groups of buildings (Caransebes Oravita, Baile Herculane Bocsa and Anina), museums and memorial houses (Resita Caransebes Oravita, Varadi, Ocna de Fier, Anina, Moldova Noua).Although the Caras-Severin County hosts an important number of registered monuments, the tourist flows are very low. This is mainly due to poor accessibility and the lack of integrated road infrastructure and accommodations in the rural area.

The rural cultural heritage is also a highly significant asset of Caras-Severin. This includes the Rudaria valley (in the Eftimie Murgu commune) watermills that have not only an utilitarian use, but have inspired legends and folklore connected to the rural wedding rituals and traditions. Their ancient history and architectural characteristics form a highly specific genius locus.

In Hunedoara county, the tourism anthropic resources are various, including Roman cities and fortresses (the complex Ulpia Augusta Dacia Traiana Sarmizegetusa, Sarmizegetusa Regia), medieval fortresses (Corvin Castle, Deva Fortress), historical and religious art and architecture (Deva, Hunedoara, Calugara), museums and art galleries, ethnography and folklore.[37]

Box 7 - Archaeological Landmarks of Western Romania

In the Orastie mountains of the West Region lie the ruins of Sarmizegetusa Regia, the residence of the ancient Dacians kings. The city was built in a strategic location at a height of 1200 meters, among forests, and had administrative as well as religious functions. Aside from dwellings, the complex encompasses temples, stone calendars, and six fortresses (Sarmizegetusa, Costești-Blidaru, Piatra Roșie, Costeşti-Cetățuie, Căpâlna and Băniţa), all of which have been designated UNESCO World Heritage sites.

In 106 AD Dacia was annexed to the Roman Empire by Emperor Trajan, who ordered the construction of a new capital bearing his name, Ulpia Traiana Sarmisegetusa, located 40 km from the Dacian site. The city remained the administrative center of Dacia throughout the second and third century. Visitors can still see the forum, the amphitheater, and the ruins of palaces, baths, and the public buildings of a once flourishing capital.

In Timis county, the main cultural heritage assets are: medieval castles and fortresses (Huniade Castle in Timișoara), groups of buildings and monasteries (Baroque Palace of Timișoara, the Castle of Queen Elizabeth from Banloc, Partos Monastery, Saraca Monastery), cultural events and festivals, museums and memorial houses (Lugoj Traian Vuia), ethnography and art craft (Banat Village Museum, Dumbrava).

[37] Ulpia Augusta Dacia Traiana Sarmizegetusa- was the capital and the largest city of Roman Dacia. Sarmizegetusa Regia was the capital and the most important military, religious and political centre of the Dacians, while *Corvin Castle* dates from the mid-15th century, and was built mainly in late Gothic style, but has Renaissance architectural elements.

It is evident that the West Region encompasses a significant number of monuments and historical sites. However, these are not included in a common integrated thematic road and have not been adequately promoted. Many aristocratic 18th century castles in the rural areas of the West Region (mainly Arad and Timis) have degraded because of unclear ownership rights and the lack of funds for rehabilitation works. The intangible cultural heritage is also well represented in this region by folklore and traditions. The best-known intangible heritage element of the West Region is the Călușarii, a very dynamic dance that has seemingly ancient, pre-Christian origins and that was included on the list of UNESCO intangible heritage.

The main challenges to the development of eco-tourism in the Western part of Romania include: i) underdeveloped or old mountain/nature tourism infrastructure; ii) lack of linkages with the European greenway network; iii) lack of interpretation/guiding or tourism information infrastructure, especially in natural

Spa resources and health tourism

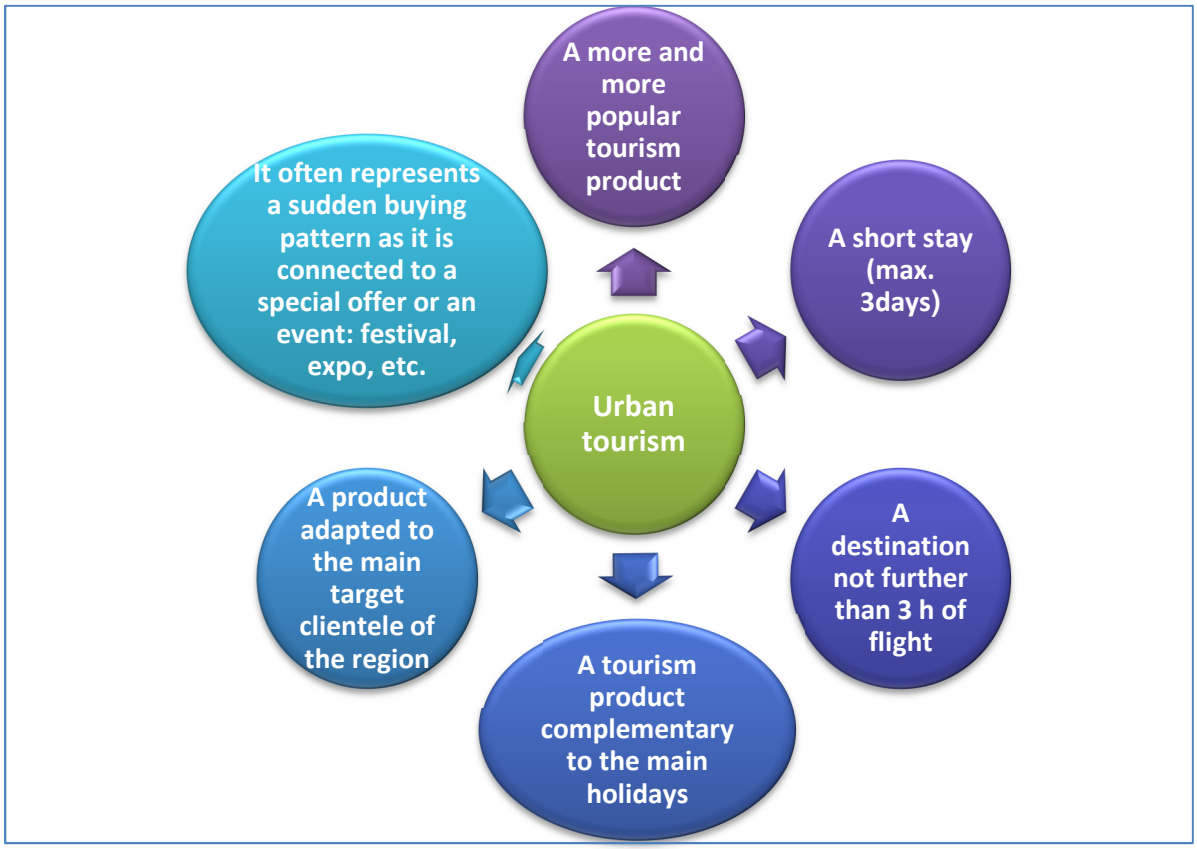
The West Region has several important spa resorts, as: i) Buzias and Baile Calacea in Timis county; ii) Moneasa and Lipova Bai in Arad county; iii) Baile Herculane in Caras-Severin county; and iv) Geoagiu Bai and Baile Calan in Hunedoara County. These resorts are key assets for tourism in the West Region due to the quality of thermal springs, their location, their historical heritage, the national custom of spa holidays and the new international trend in spa and wellness tourism.

Nevertheless, these spa resorts have not been modernized since the fall of communism and have suffered as a result of the inefficient privatization strategy undertaken at the end of the 1990s. Their accommodation facilities are no longer competitive and West region tourists prefer to go to Hungarian spa resorts. Other weaknesses of the spa resorts in the West region can be pointed as follows: i) difficult access to natural resources (ANRM exploitation rights); ii) old accommodation facilities that need renovation works; iii) ageing medical staff; iv) lack of leisure facilities; v) high proportion of social tourists: pensioners financed though the state subsidized spa holiday voucher system; vi) legal ambiguities regarding land ownership that arise during the process of restitution of properties confiscated during the communist period and the failure of the privatizations carried out by the public authorities; vii) prevailing reactive spa treatments over pro-active wellness treatments; viii) lack of urban city centre renovation in historical spas; and ix) seasonality issues: very low occupancy rate except during the summer months.

Urban & MICE tourism

Urban tourism is increasingly perceived as an instrument and facilitator for promotion of the European cities as tourism destinations. It creates connections to other sectors that become increasingly important: it generates new equipment/infrastructure (museums, accommodation facilities, restaurants, etc.) which can have an impact on the quality of life of residents. In addition, tourism development leverages the cities' image and perception: if a town is viewed as a touristic destination, it becomes attractive not only for tourists but also for its inhabitants and the business sector as a whole. In this context, cities increasingly implement territorial branding strategies that are based on tourism arguments « I Amsterdam », « Only Lyon », « Be Berlin », and the famous « I Love NY ».

Figure 52 - Features of Urban Tourism



The main form of tourism in the West Region cities is business tourism. The attractiveness of the area in economic and investments terms is illustrated by the fact that business travelers represent most of the overnight stays in the hotels of the West Region's major cities.

The geographical proximity of the West Region to Western and Central Europe, the Arad and Timisoara airports, the three main European routes (E68, E70, E79), the three international railway lines, and the economic potential of the region attract investors, thus contributing to the emergence and development of meetings, incentives, conventions and exhibitions (MICE) tourism in the West Region.[38] The two exhibitions and conference centres - Expo Arad International and CRAFT Timisoara - have a cross border regional impact and are strengthening the position of Arad-Timisoara as a Euro regional economic hub.

Provided a number of key issues are appropriately addressed the urban and MICE tourism have the potential to flourish in the West Region. The following issues constitute important bottlenecks for this tourism segment: i) high seasonality and low average stay; ii) low capacity to convert business tourism flows into leisure tourism ones; iii) low connectivity between the two major economical cities (few trains, no bus lines between the airport and the Arad convention center); and iv) lack of multipurpose centers for sports, business and cultural events.

[38] MICE includes visitors participating in the following activities: i) Association/Charity/Institute/Society Events; ii) Governmental meetings & conferences; iii) Corporate Events – dinners, product launches, conferences, awards etc; iv) Incentive travel; v) corporate hospitality; and vi) exhibitions & trade shows

The West region has a latent comparative advantage in the tourism sector. Indeed, as shown before, the main reasons for this inference lie behind the location-specific assets of the region which can be summarized as follows:

- Natural heritage (including natural parks and thermal springs)
- Historical and architectural heritage
- Better accessibility than most of the Romanian regions and the advantage of emerging as a cross border business center for its neighbors.

Overall, for the whole tourism sector – considering all its niches - there are certain challenges that need to be addressed in order to capitalize on the important natural and historical endowments. First, the tourism sector has not been considered by the political stakeholders as a priority but has continued to develop and a significant level of know-how still exists in this area, especially in the field of spa tourism. Second, there is not a *Destination Management Organizations* at regional, county and local levels which reflects the absence of a common integrated strategy; as a consequence, there is an unjustified competition between complementary destinations such as Timisoara and Arad that are competing to become the European Capital of Culture. Third, the unclear ownership rights for the historical and cultural patrimony, like castles, spa facilities, etc. Fourth, the lack of access to European funds due to ownership problems and non-eligibility of concession grants by the management authority. Fifth, the reduced public administrative capacity for complex investment tourism-related projects, or for drawing and managing PPP projects. Finally, the lack of regional integrated tourism products to be sold on local and foreign tourism markets

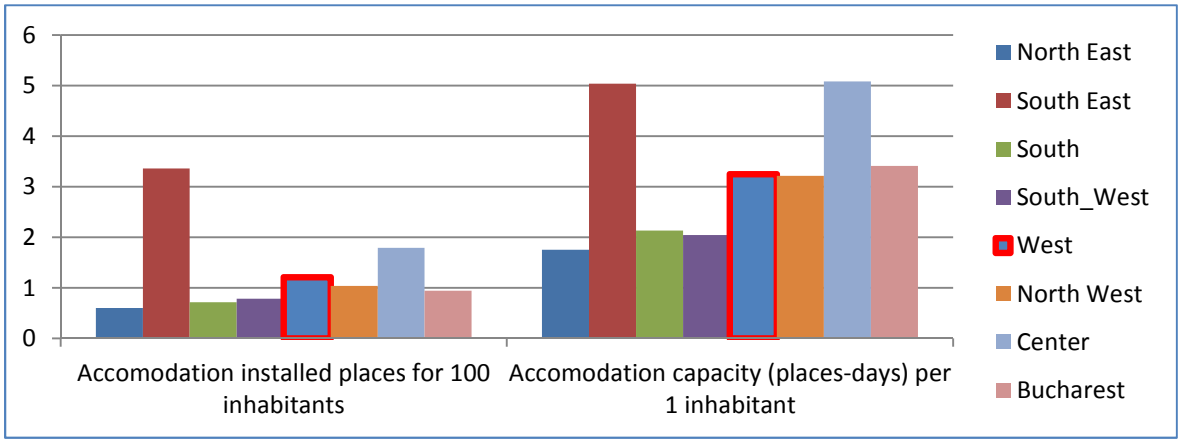
4.6.2. Some key numbers on the tourism cluster in West region

Accommodation capacity

The overall touristic accommodation capacity of the West Region places it amongst the best-developed regions in Romania from this standpoint. Being one of the less populated development regions, the Western Region is nevertheless the 3rd in the country in terms of the number of accommodation places per 100 inhabitants. It is surpassed only by the South-East Region (which includes the sea side resorts on the Black Sea) and by the Central Region (with Sibiu city and the Brasov county ski resorts like Poiana Brasov), while Bucharest-Ilfov and the South regions (including the Prahova Valley resort towns: Sinaia, Busteni, Azuga) have less accommodation capacity per 100 inhabitants. The same hierarchy is maintained when one looks at at the accommodation capacity per inhabitant[39], except for Bucharest that had a slightly higher average than the West Region in 2011 (Figure 53).

[39] The installed accommodation capacity is the accommodation capacity (number of beds) that is legally on the market, (i.e.: that has obtained the public authorities certification). It is calculated at one precise moment of the year (usually the 31st of July or the 31st of December), without taking into account if the beds are really available or not (if the hotel is open or not). This is thus *an administrative variable obtained from administrative records* and not from field research. The accommodation capacity data is obtained by adding the number of beds that are effectively available each month. For example, a hotel located on the seaside that has an installed accommodation of 100 beds can be closed between January and April. So the Romanian National Statistics Office will consider that the accommodation capacity is 0 during M1, M2, M3 and M4 even if the installed accommodation capacity is of 100 beds. *This indicator is obtained through monthly survey and data collected on the field from accommodation facilities.* Accommodation units represents number of accommodation units (number of hotels + number of

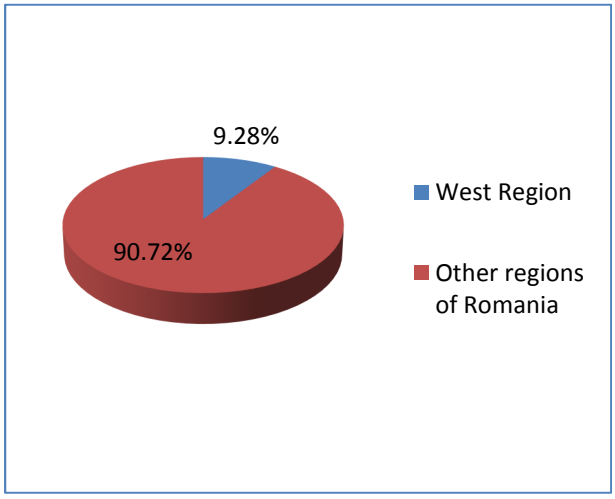
Figure 53 - Accommodation capacity comparison between the Romanian regions (2011)



Source: World Bank staff elaboration based on INS data

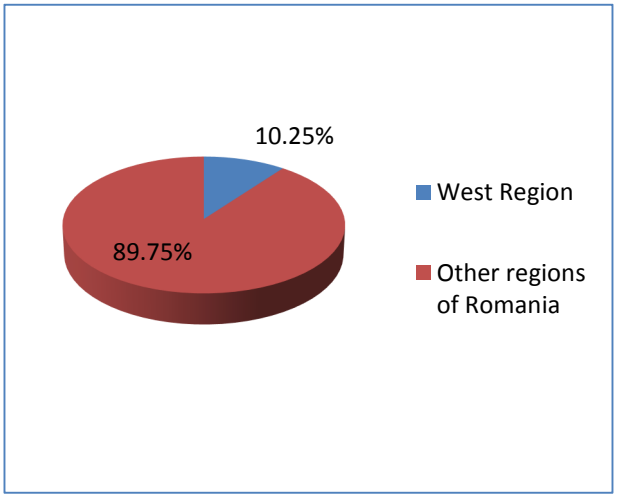
The West Region of Romania represents around 10% of the Romanian tourism accommodation capacity as well as accommodation units (hotels, hostels, etc), as shown below. The West Region represents for almost all the types of accommodation between 8% and 10% of the national installed accommodation capacity.

Figure 54 - Accommodation capacity 2011 - %



Source: World Bank staff elaboration based on INS data

Figure 55 - Accommodation units, 2011 - %[40]



Source: World Bank staff elaboration based on INS data

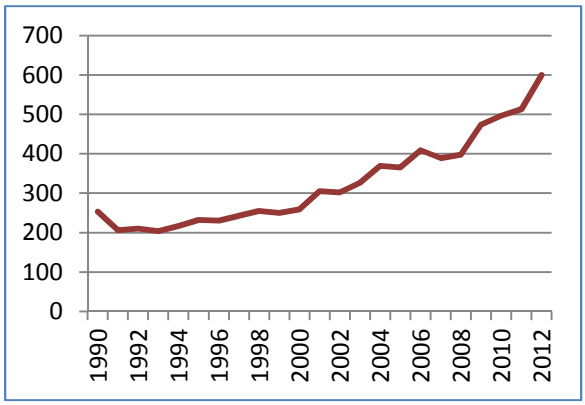
The following charts illustrate the evolution of the accommodation capacity of the West Region from the beginning of the 1990s to the present. As in the case of other Romanian regions, there was a transition from fewer and larger accommodation facilities owned by the state to many smaller accommodation facilities (more than 2 times more units in 2012 than in 1990). Concerning the installed

hostels + number of camping facilities, etc) according to the Romanian fiscal definition and the certification provided by public authorities.

[40] The indicator "accommodation units" (in Romanian "unitati de cazare") represents, broadly, the number of hotels, hostels, etc

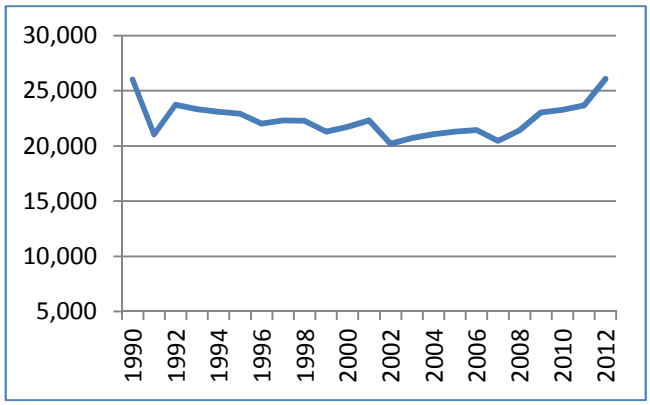
accommodation capacity, Figure 57 shows that after the initial steep decrease of 1990-1991, it took the West Region until 2012 to register again the same volume of capacity.

Figure 56 - The evolution of the number of units of accommodation West Region 1990-2012



Source: World Bank staff elaboration based on INS data

Figure 57 - Evolution of West Region's installed accommodation capacity



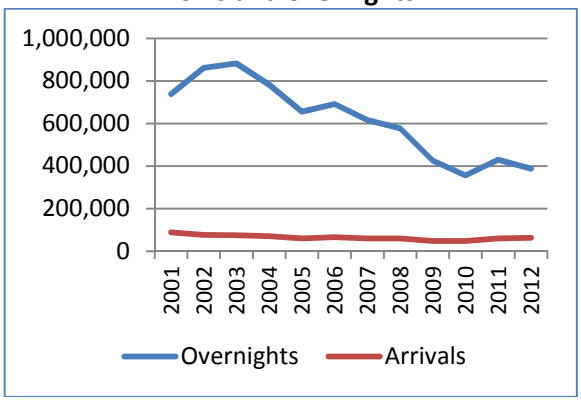
Source: World Bank staff elaboration based on INS data

As in other parts of Romania, the West Region is dominated in terms of accommodation facilities by hotels (more than 50% of the installed accommodation capacity). This is the case particularly in a county like Timis with an important urban touristic destination – the hotels in Timisoara represent more than 50% of the county's accommodation capacity.

Tourist flows

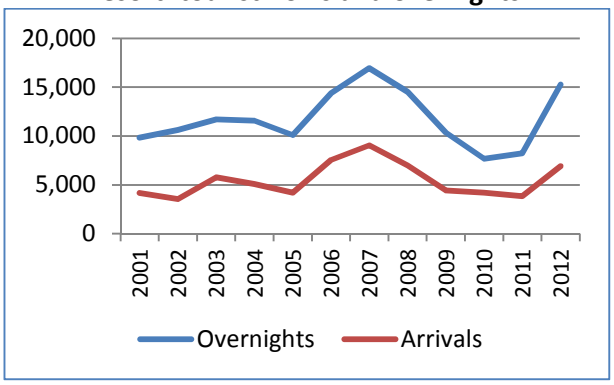
The evolution of tourist flows to the West Region (domestic and foreign) was similar to the national trend. Affected by a severe fall after 1989, tourist flow experienced an increase during the 2000-2008 growth period of the Romanian economy. Nevertheless, during this time frame, significant differences appear between the four counties. If Arad and Timisoara in particular experienced a relatively robust growth during the last half of this interval (almost a 20% increase of overnights between 2005 and 2008 for Timisoara), Caras-Severin and Hunedoara registered lower tourist flows between 2005 and 2008 than between 2000 and 2004. This difference between the more developed counties – Timisoara (and to a lesser extent Arad), and the other counties, may in part be explained by the process of economic transition which took place in Romania during the 2000's.Two main factors can be pointed. First, the closing of the industrial plants resulted in a fall in business tourism flows as well as in a reduction of the domestic (especially intra-regional) touristic flows to the spa resorts located in Caras Severin and Hunedoara. Second, the inefficient privatization of public accommodation facilities that was followed by a lack of investment, particularly in the case of the spa resorts.

Figure 58 - Baile Herculane spa resort: tourist flows and overnights



Source: World Bank staff elaboration based on INS data

Figure 59 - Valiug (Semenic mountain resort): spa resort: tourist flows and overnights

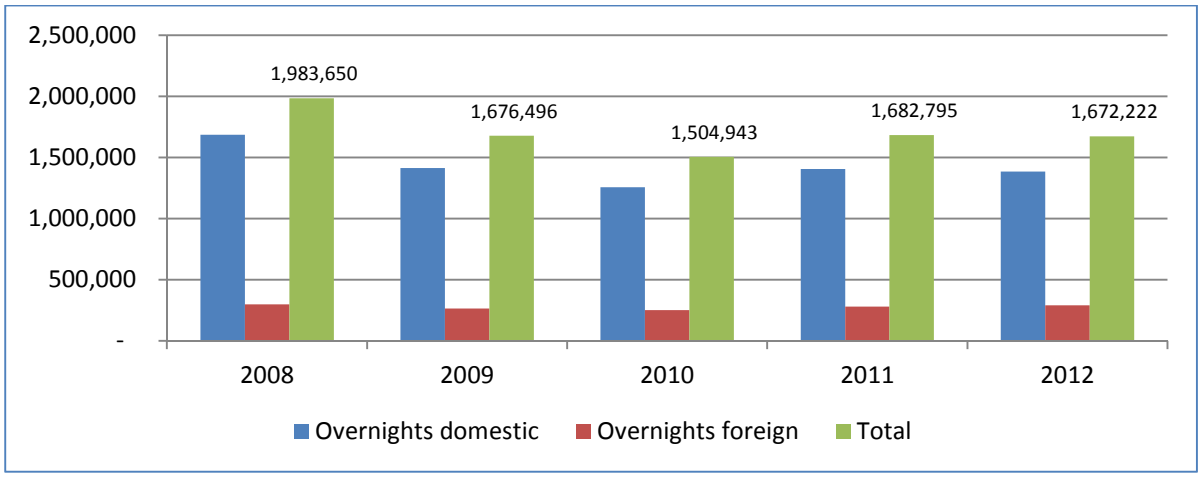


Source: World Bank staff elaboration based on INS data

The predominance of spa tourism in Caras Severin county and the significant decrease of tourist flows and overnights in the Baile Herculane spa resort can hide the development of other touristic products such as nature and active tourism in the area. For example, the Semenic mountain resort, also located in Caras Severin, has seen a significant increase in overnights and in the number of arrivals (Figure 59).

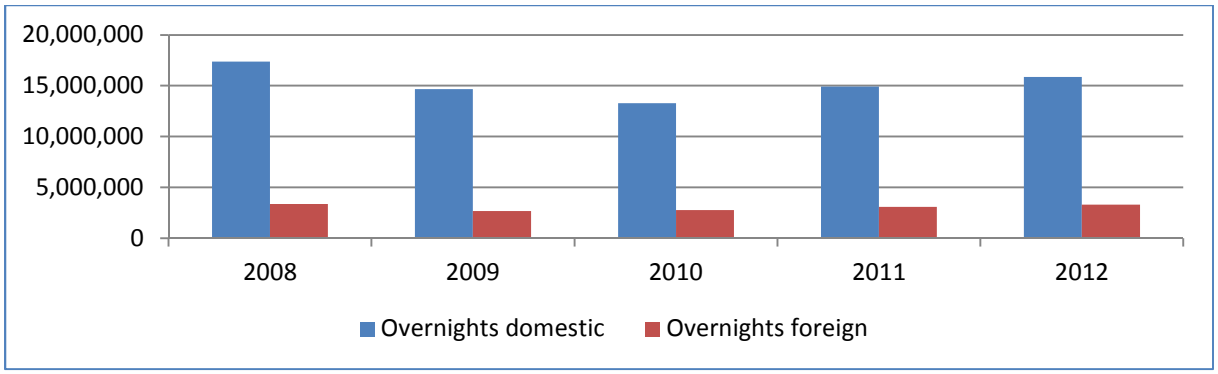
Overall, the economic crisis that struck the Romanian economy after 2008 has affected the tourism sector in the whole country, including the West Region and all its counties. The figures below make a comparison between the situation of the West Region and Romania in terms of tourism flows between 2008 and 2012.

Figure 60 - Tourism flows to the West Region (overnights)



Source: World Bank staff elaboration based on INS data

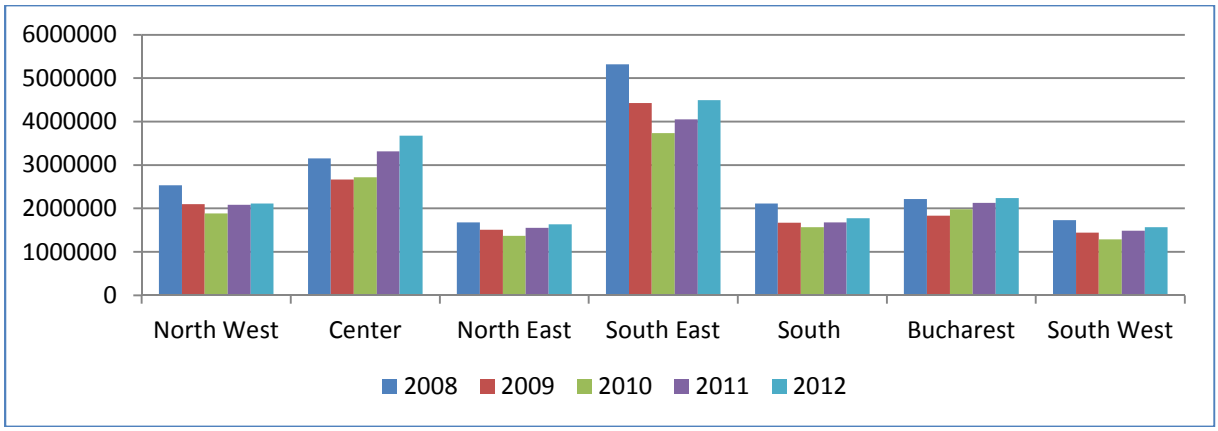
Figure 61 - Tourism flows to Romania (overnights)



Source: World Bank staff elaboration based on INS data

As it can be observed in the previous figures, after the negative impact of the crisis between 2008 and2010, the West Region followed the national upward trend in 2011 and registered a growth in the number of overnights spent by both local and foreign tourists. In 2012, the West Region had mixed results, with a decrease in the number of overnights spent by domestic tourists and a slight increase in overnights spent by foreign tourists. Romania as a whole registered an increase in the overnights spent by both types of tourists in 2012, compared to 2011. As in the other Romanian regions, in terms of volume the West Region tourism flows are strongly dominated by domestic touristic flows (Figure 54). Therefore, the slight decrease of domestic tourism in 2012 compared to 2011 has led to an overall decrease in tourist flows. The West Region was the only Romanian region which displayed this trend.

Figure 62 –Total tourism flows to other regions in Romania

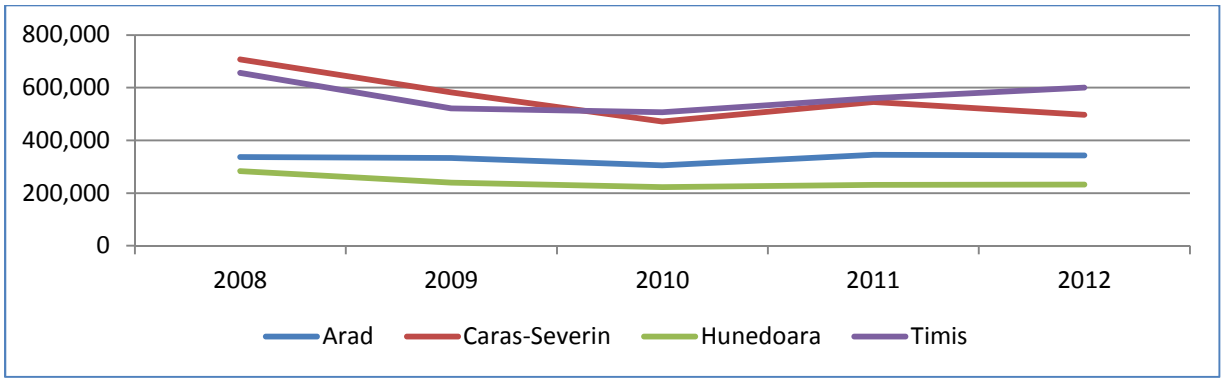


Source: World Bank staff elaboration based on INS data

A comparison between arrivals and overnights is important in order to understand the specificities of the West Region. The West Region saw in 2012 an increase in arrivals but a decrease in overnights. This might be explained by the importance of business tourism in the main cities of the region (Timisoara and Arad) and the tendency of this type of clientele to adapt their behavior to the overall economic situation: business tourists arrived in increasing numbers but their average stay decreased. However, another explanatory factor is the decrease in the number of arrivals to the main spa resorts of the region and of the average length of stay, particularly in the most important one: Baile Herculane.

Inside the West Region, the 2008-2012 period shows a continuation of the previous trends with certain minor fluctuations due to the general economic situation of both Romania and the main inbound markets (Italy, Germany, Austria, Hungary, Serbia). After a decrease caused by the economic crisis in 2008-2010, the overnights and arrivals have been increasing in the Timis county, which has surpassed Caras-Severin county in terms of overnights spent. In 2012, tourist arrivals increased in all four counties. Nevertheless, the overnights situation is mixed: Caras-Severin continued to decrease (even if it registered a slight reversal of trend in 2011), Hunedoara did not manage to rebound and Arad stagnated in 2012. Hunedoara remained the least visited county, while Arad is a fluctuating destination: in 2011 it saw an increase in terms of overnights while arrivals were decreasing. In 2012, arrivals increased while overnights decreased slightly (Figure 63).

Figure 63 - Overnights spent by county in the West region 2008-2012



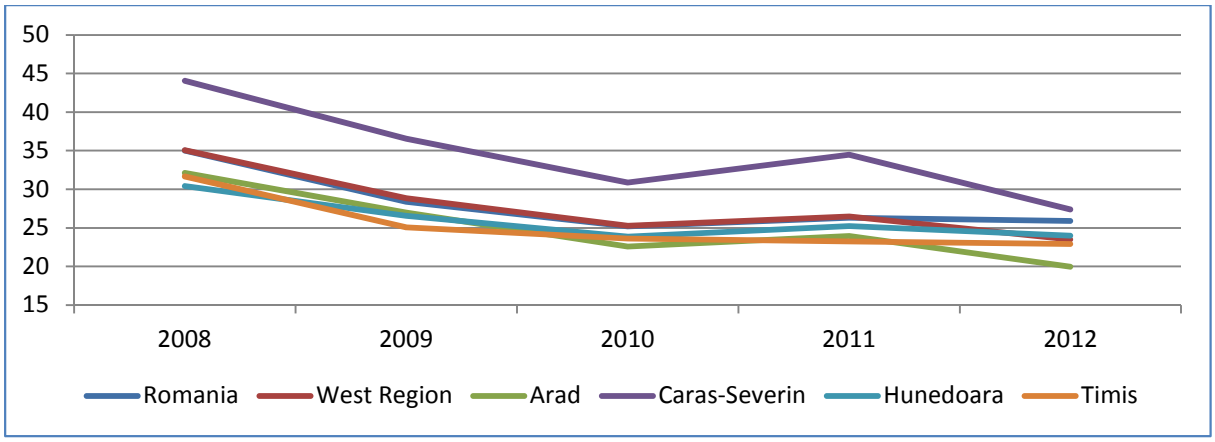
Source: World Bank staff elaboration based on INS data

An important aspect of the tourism sector is seasonality. A well-balanced seasonality ensures a viable tourism economy and strong positive externalities for related sectors such as transport, retail, public services, etc. The seasonality of the West region is similar to the national one, with a high touristic season during the summer and the beginning of the autumn, and a difficult low season during the winter months (overnights spent in January, February and March represent less than 50% of the overnights during July and August). This seasonality pattern represents a highly adverse feature of the tourism economy of the region, as it gives rise to a "vicious circle": bad seasonality → limited profitability in the tourism industry → low level of investments in developing accommodation and leisure facilities → low tourism attractiveness → bad seasonality.

The occupancy rate is another important indicator of the economic situation of the tourism sector. Its connection to seasonality is important as Romanian tourism providers usually try to mitigate bad seasonality through a higher flexibility in the volume of services/places made available on the market during the low season. The occupancy rate can thus be used to understand the degree of adaptation of tourism operators to the seasonality patterns region's seasonality.

The West Region has followed a similar trend to the rest of Romania and is an average region in terms of monthly occupancy rates. The chart below indicates the yearly average occupancy rate of the West region counties compared to the regional performance and to the national situation.

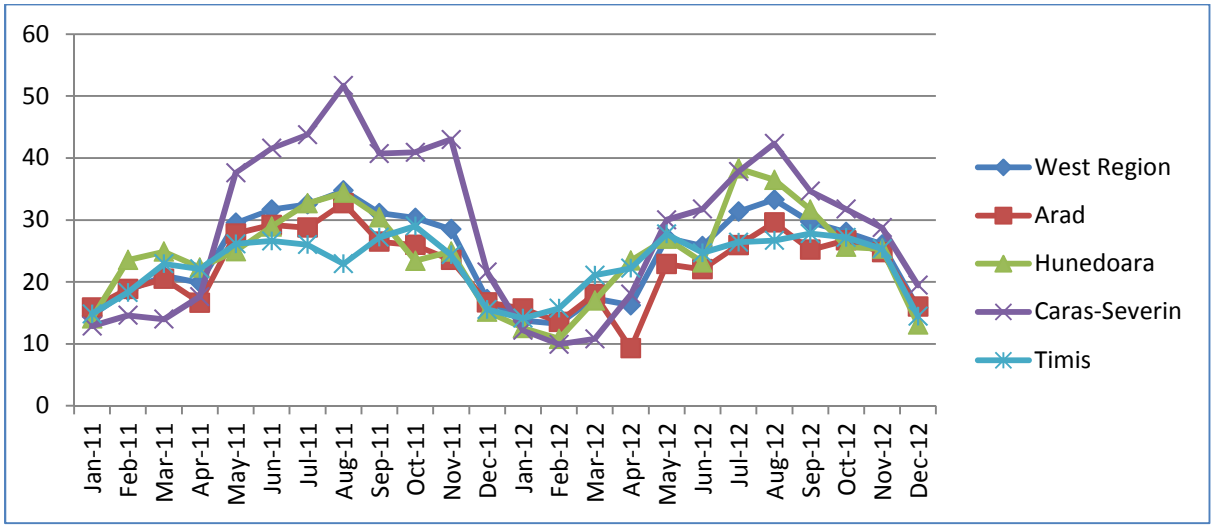
Figure 64 - Yearly average occupancy rate (%)



Source: World Bank staff elaboration based on INS data

Some conclusions can be drawn from these occupancy rates figures. First, the West Region overall occupancy rate is almost identical with the national average, which is a low one. Second, the overall trend in the Western Region mirrors the national one: strong decrease during the crisis years in 2008-2010 and a slight rebound in 2011. Third, in 2012 the occupancy rate in the Western Region was 23.5%, a relatively low figure. Caras-Severin has a slightly higher occupancy rate (that is rapidly decreasing towards the regional and national average) because of the performance of the Baile Herculane spa resort. Finally, Timis county has displayed a more stable occupancy rate and moderate growth due to the opening of new hotels for which construction started before the crisis.

Figure 65 - Monthly occupancy rate variation by county (%)



Source: World Bank staff elaboration based on INS data

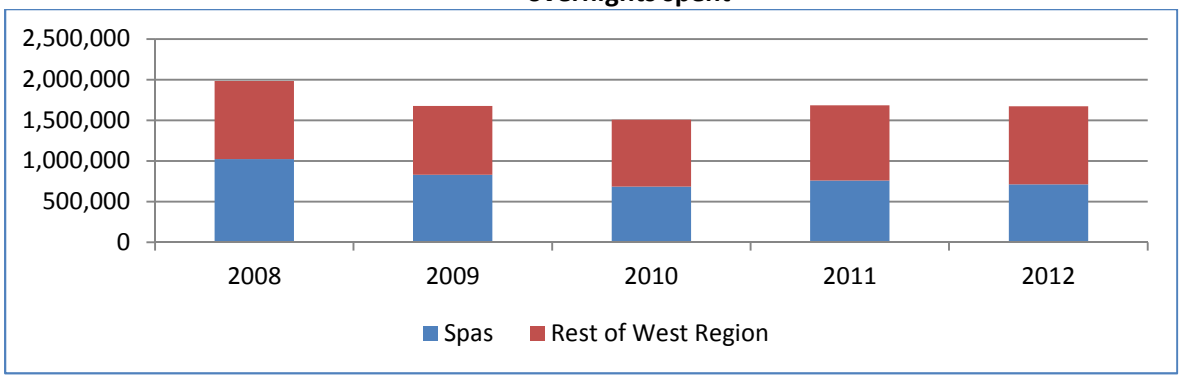
Analysis of monthly data highlights a number of features (Figure 65). First, there are differences in seasonality: during winter, the occupancy rate of Caras-Severin facilities represents 20%-25% of the summer occupancy rate, while in Timis the lowest month (January) represents more than 50% of September occupancy rate. Second, the high season is not similar across counties: The summer months represent the high season in Caras Severin, Hunedoara and Arad (due to Romanian emigrants coming

back home for holidays and passing through Arad), while for Timis the high season takes place in the spring and autumn (primarily in September, October and May).

Key numbers for spa & wellness tourism

An analysis of the spa sector in the West Region can give some indication on the overall tourism flows. This is primarily because spa tourism in the region accounts for a large part of the touristic offer (accommodation capacity, places-days per year), as the spa resorts built during the communist period include large treatment and accommodation facilities for state subsidized clienteles (mainly pensioners). The main spa resorts and spa towns in the West Region are: Baile Herculane, Geoagiu, Vata, Buzias, Lipova and Moneasa.

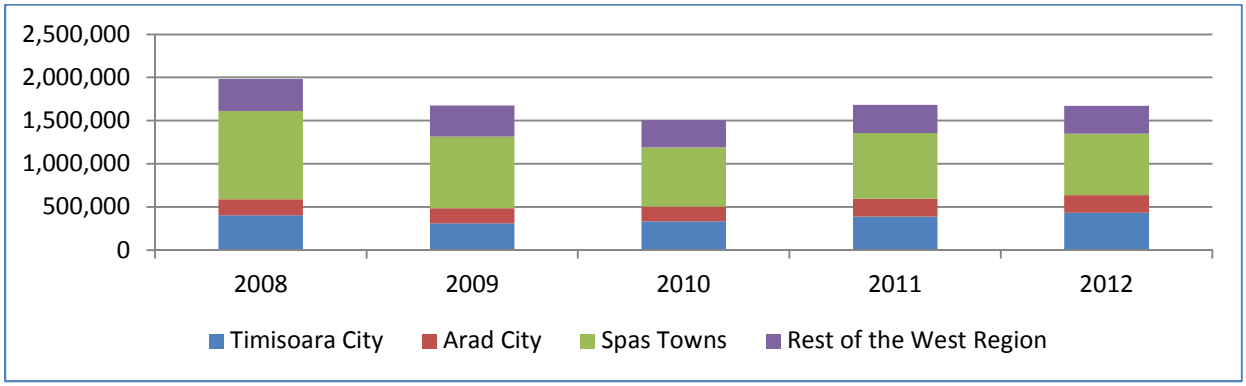
Figure 66 - Share of spa tourism in overall tourism flows (overnights) in the West Region, annual overnights spent



Source: World Bank staff elaboration based on INS data

Tourism flows in the West Region are strongly linked to spa tourism which represents between 40% and 50% of all overnights spent every year in tourist accommodations. The share of spas in the total is however decreasing due to the difficulties affecting the traditional spa resorts (see Figure 67).

Figure 67 - Distribution of the number of overnights spent in the West Region by main tourist destination



Source: World Bank staff elaboration based on INS data

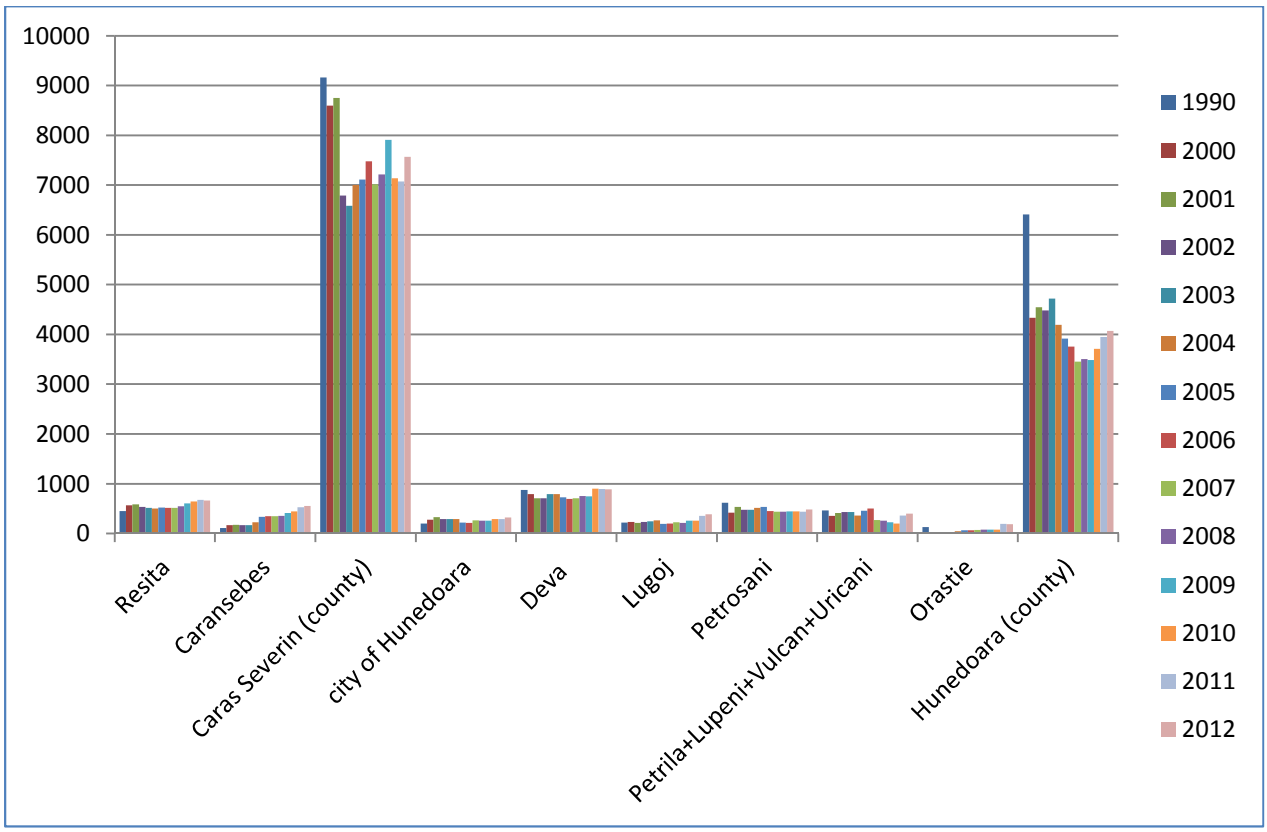
If the analysis considers the overnights in the main urban destinations (Timisoara and Arad) added to the ones in spa resorts, it can be seen that the seasonality of spa tourism in the West region is similar to the national one: high influx of tourists in the summer months and much lower activity during

the winter (an exception is Lipova, a town in Arad county, due to a decrease in the number of arrivals experienced in the last few years). This type of seasonality patterns lead to an annual average occupancy rate below 50%, as spa facilities are open usually all year long, which suggests that the development of MICE tourism is one of the priorities of spa tourism providers in order to mitigate the seasonality problem.

Key numbers for city tourism and business tourism

Urban and business tourism is another other important tourism sub-sector in the West Region, given the importance of Timisoara and Arad as business destinations. The weight of the other cities in the region is low.[41.] Resita, Deva, Petrosani (including all the other mining satellite towns such as Lupeni, Vulcan, Petrila), Hunedoara, Caransebes, Orastie and Lugoj are the other main cities in the region. They are mainly industrial or mining towns, with very low tourism intensity, even though some of them have cultural-historic assets that could attract visitors[42].

Figure 68 - Evolution of the number of installed accommodation places, main towns

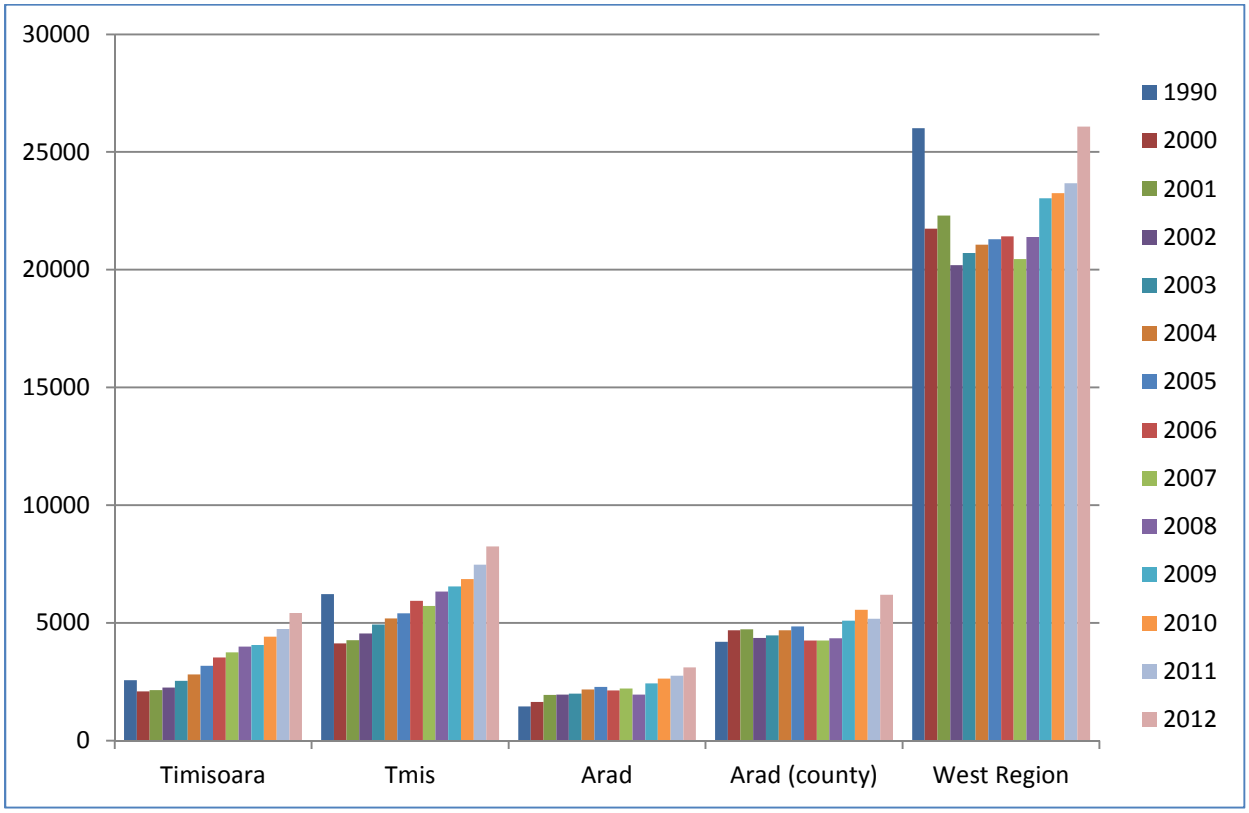


Source: World Bank staff elaboration based on INS data

[41] In the West Region almost all the spa resorts are located in towns, many of them owing their urban character to the existence of the spa facilities. These are not included in this section as they are mainly frequented by tourists for spa treatment and not for cultural or urban attractions, even though spa towns such as Baile Herculane have an impressive architectural and historical patrimony, which unfortunately attracts very few people due to its state of decay.

[42] Hunedoara castle, Deva citadel, Hunedoara and Resita's industrial patrimony, Lugoj baroque city center and gothic architecture, medieval citadel in Orastie, etc.

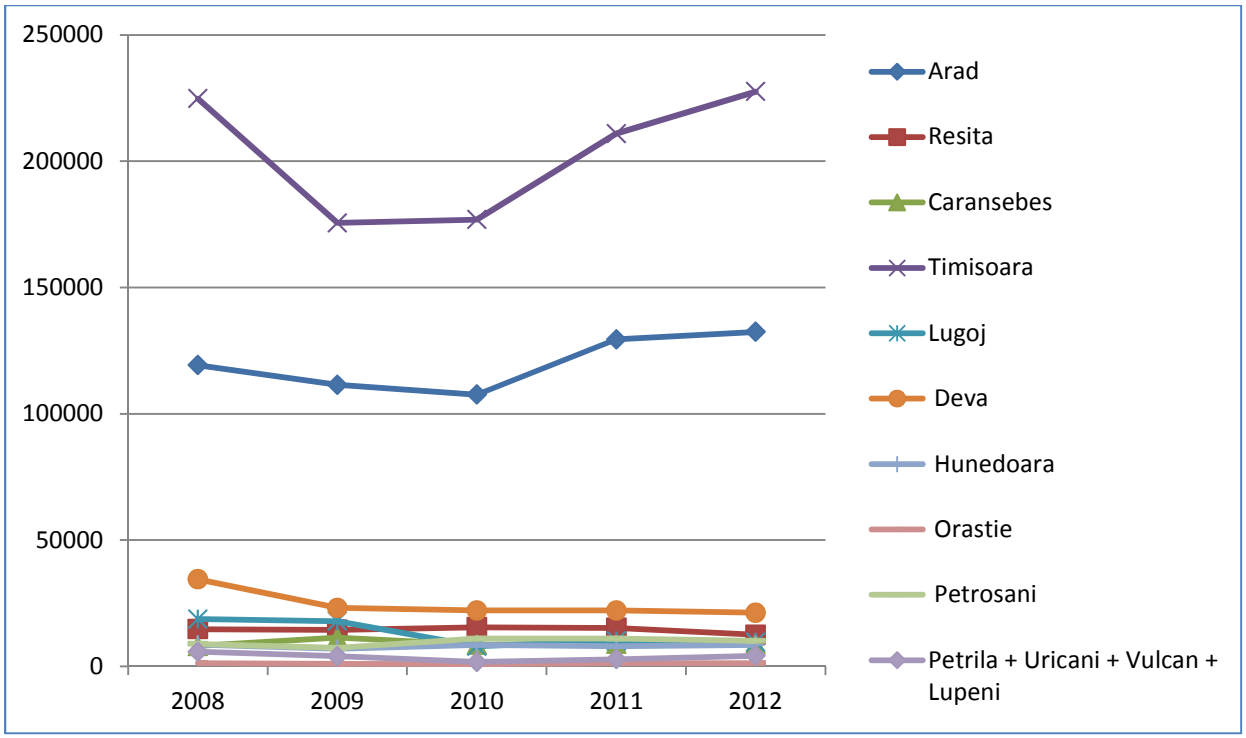
Figure 69 - Evolution of the number of installed accommodation places in the main touristic towns and their counties



Source: World Bank staff elaboration based on INS data

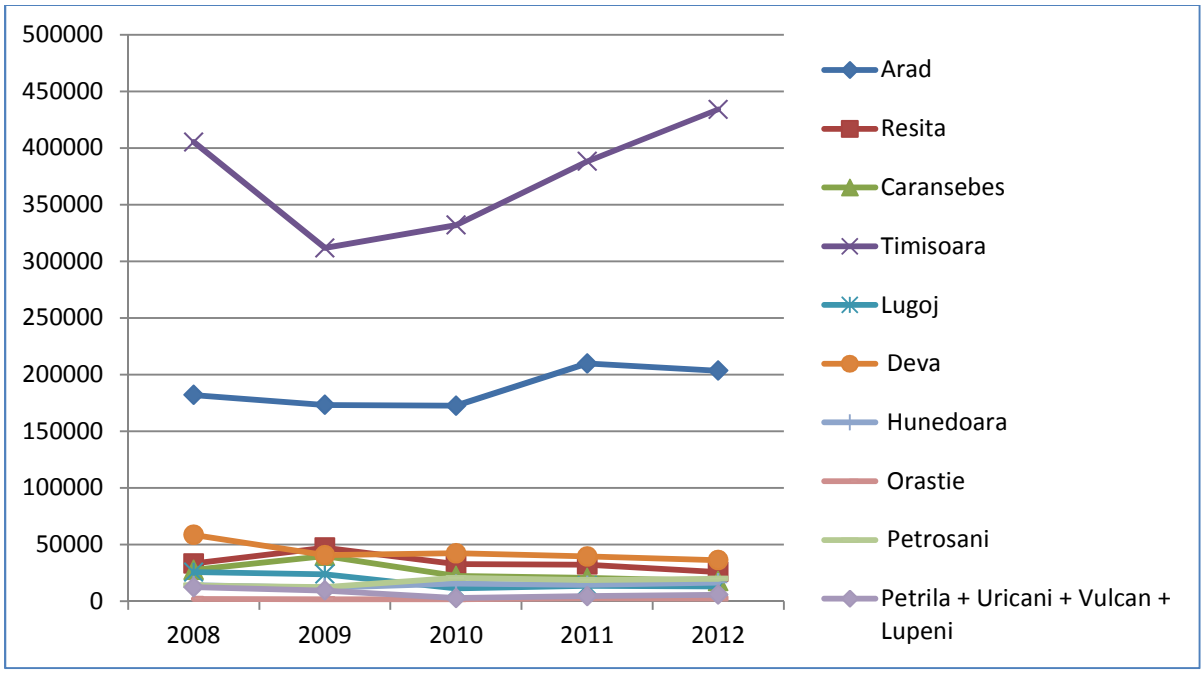
Several facts and conclusions can be drawn from the available data. First, the accommodation capacity in the urban destinations of the West Region has steadily increased between 1990 and. Despite the general economic conditions prevalent since 2008, the number of accommodation units and the overall urban accommodation capacity have followed an upward trend. Some of the less developed urban tourism destinations registered slight decreases in accommodation capacity during the economic crisis but managed to grow again in 2011-2012. Second, Timisoara and Arad represent 32% of the overall accommodation capacity in the West Region (having increased from only 15% in 1990). This dynamic evolution is obviously due to business tourism that has required newer and more modern accommodation facilities in the two economic centers of the West region. Third, Timisoara's tourism capacity represents 2/3 of the accommodation capacity of the entire Timis county. In terms of accommodation capacity, Timis and Arad are far above the national average. Fourth, the tourism sector in Caras Severin is mainly concentrated in Baile Herculane while Hunedoara has a low accommodation capacity with a clear lack of tourism accommodations outside the main cities.

Figure 70 - Annual arrivals in the main towns 2008-2012



Source: World Bank staff elaboration based on INS data

Figure 71 - Annual number of overnights spent in the main towns in the West Region



Source: World Bank staff elaboration based on INS data

There is an important gap between the volume of arrivals and overnights in Timisoara and Arad and the performance of these indicators in the other major towns of the West Region. Only Timisoara recovered completely in 2011-2012 from the 2008-2010 period. The other towns saw fluctuations in the

flow of tourists and display an overall decreasing trend. Petrosani and its satellite towns that are situated near the ski resorts of Straja and Parang experienced a limited increase in 2012 vs. 2011.

Seasonality is another important aspect of urban tourism. Timisoara and Arad have a similar seasonality with a constant annual pattern (even though Arad has a better occupancy rate during the summer season – due to its position of "country gate" during the summer holidays – while Timisoara performs better during the spring and autumn). The other major towns show important fluctuation from one year to the other. Occupancy figures indicate that apart from the county capitals (Resita and Deva), the other towns in the region are not destinations for urban tourism. The seasonality of tourist flows is influenced by the towns' proximity to other types of attractions (e.g.: the Straja ski resort near Lupeni), or by one-off events that dramatically alter the usually very low occupancy rate (e.g.: Hunedoara in July 2012[43])

The average occupancy rate in the towns of the West Region over the last two years was low (around 15%). The average stay in the largest towns of the West Region is similar to the national average for county capitals, including Bucharest (with the exception of Caransebes that registered very high averages in 2008 and 2009). Urban tourism in the West Region displays low occupancy rates and low average length of stay, in absolute terms.

4.6.2. R&D activity, linkages with RTDI supply and connections with global networks: how does it relate to specialization in the sector?

Tourism competitiveness and innovation is strongly linked to the creation of a regional innovation system that can facilitate the absorption of knowledge (education and training, advanced services) and its dissemination (technology transfer, ICT, entrepreneurship). As highlighted previously, the West Region appears to have a latent comparative advantage in tourism. Therefore, tourism sector policies must evaluate the regional instruments that focus on strengthening the capacity to access, take up, and disseminate knowledge and technology transfer in the tourism field. These instruments can also support Public/Private infrastructure investments and promote better governance to help unleash the existing comparative advantage.

Unfortunately, no regional or local instrument of this type exists in the West Region and this is mainly because regional political but also economic stakeholders do not appear to consider tourism as one of the main competitive assets of the West region. Moreover, economic and political stakeholders from different local areas and counties see themselves as competitors more than providers of complementary touristic offers.

For example, Timisoara and Arad are competing to become the European Capital of Culture in 2021. In order to succeed, these two cities are drafting cultural and tourism strategies that are in competition and that will propose the creation of similar infrastructures, to be financed during the next programming period in the two cities. It is clear that by taking this approach the two cities are lowering their chances of winning the competition against larger cities such as Cluj and Brasov. By having a common application Timisoara-Arad, these cities would have increased their chance to win and may have been the preferred candidate. This type of competition is important because: it requires the drafting of a clear strategy and its implementation by the public stakeholders; it attracts and stimulates

[43] Opera Nights 2012 Festival in the Hunedoara Castle,13th-15th of July 2012

long term investments in the tourism sector; and it helps to launch a new tourist destination on the National and European market.

Therefore, the West region needs a regional instrument to support cooperation between (i) tourist actors and (ii) between the tourism sector and different innovation actors. In this context, the creation of a tourism cluster is mandatory to implement the smart specialization strategy in the tourism sector because clusters are powerful instruments for fostering sectorial competitiveness, innovation, and regional growth.

The tourism sector in the West region and more generally in Romania is not linked to global networks and the national and regional tourism offer is not commercialized outside the country or even on the local market. Indeed, an estimated 95% of the turnover of Romanian tour operators is realized through outgoing trips. Very few Romanian tour operators have developed incoming offers. Romanian regional public stakeholders and tour operators are often invited abroad to present local tourism products but they do not usually participate to these events or do not have any concrete tourism products to sell. Once again, the lack of affinity of tourism private and public stakeholders is clear. Promotion and marketing campaigns exist but usually there is no tourism product to offer and not even an up-to-date tourism website managed by public or private stakeholders (NGOs, Tour Operators, etc).

In addition, tourism stakeholders in neighboring countries are trying to find Romanian public and private partners in order to develop common cross border tourism products. The Serbian Tourism Management Organization has been attempting for two years to encourage Romanian public authorities to develop a greenway network because the extension of the EuroVeloroute will also have benefits on the Serbian side. Moreover, they encourage the setting up of a regional or national Convention Bureau that will join their initiative of creating a regional association for the promotion of MICE tourism. Overall, there is real potential for the West Region to become connected to a global tourism network if regional tourism stakeholders organize themselves to take advantage of the current opportunities.

The tourism sector will also benefit from an increased use of ICT to advertise the region's natural resources (see Figure 72). Development of software to manage booking systems is one area which is exemplified in the smart specialization concept note by David, Foray and Hall (2011). This example suits the West Region well, as it pinpoints the application of a general purpose technology (ICT software) in a service sector. The West Region may follow this example in its tourism sector modernization program under its smart specialization strategy. The sector will benefit from the comparative advantage of the West Region in the ICT sector, through collaborations with the local companies and the universities.

4.6.3. An evaluation of the horizontal constraints that affect the sector

Ease of entry-exit

The tourism sector specific hindrances concern mainly entrepreneurs in rural accommodation facilities. The administrative procedure is long, complicated and expensive. Investors need to obtain various authorizations (i.e. fire protection, environmental, etc.), a process that often discourages potential entrepreneurs. Administrative procedures are too complex to manage for small investors, without financial possibility to subcontract these tasks.

Access to external finance

Firms in the tourism sector face significant difficulties in accessing external finance and the lending bank rates are perceived as being too high. This appears to be a structural problem for the tourism sector in Romania. Indeed, in many other countries, the tourism industry has managed to develop based on state subsidized loans, because the ROI on tourism investments is usually lower than in other sectors and due to the fact that public authorities considered that tourism development creates more external direct and indirect benefits than other sectors. Indeed, the tourism sector remains one of the few employment-intensive sectors in Europe and one of the few alternatives to the reduction in available workplaces caused by technological change and delocalization. Moreover, tourism's contribution is not confined to generating employment, economic activity and exports. Tourism increases the payback from infrastructure and facilitates the efficient use of services. Tourism is also responsible for important indirect economic benefits and can be seen as a catalyst for the development or expansion of other economic sectors, such as agriculture, fisheries, construction, certain types of manufacturing, or handicrafts. At the same time, tourism provides an economic incentive and financial or in-kind support for the conservation of the local environment and natural resources and the conservation of cultural heritage.

Therefore, investment incentives for tourism such as preferential loans, interest subsidies or credit guaranteed loans are common features all over the world. Taiwan sustains in that way its travel agencies, Malta the refurbishment and the extension projects of hotels, hostels, apartment-hotels, guesthouses, tourist villages or restaurants. Egyptian authorities grant fuel subsidies for companies working in the tourism industry. Austria has created the Österreichische Hotel und Tourismusbank (ÖHT) that is a specialized financial institution focusing on the financing and promotion of investments in the field of tourism. In 2009, the bank provided financial assistance for a total investment volume of 828 million euros, and supported 1,433 firms. Moreover, under § 51a of the Austrian Labor Market Promotion Act (AMFG), subsidies are available for businesses and catalyst projects with significant macroeconomic, regional or labor market effects.

In Romania, no support policy has been available for this sector and it is even a complex task for tourism investors to access loans that would allow them to co-finance European funded projects.

Transport Infrastructure

Accessibility is a common problem in Romania and is usually used to explain the slow development of the tourism sector. As mentioned previously, the West region does not suffer from major accessibility problems except in rural areas. For the ecotourism subsector, the provision of basic infrastructures (roads as well as water and sewage system, waste treatment, etc.) is necessary for the development of ecotourism destinations. Without this basic infrastructure, the destination carrying capacity remains very low and tourism development can damage the environment and rapidly become unsustainable.

Legal Framework

The main legal constraints are related to the accessibility of European funds and a lack of architectural and landscape planning rules that results in a chaotic and unsustainable development of tourism areas. Consultations with stakeholders have highlighted a number of regulatory hindrances, including:

- The lack of a concession contract model for the renovation of historical buildings' facade in cities centers is preventing urban renewal projects

- It is not possible to finance projects through European funds if the direct owner of the location (buildings, historical sight, etc.) is not the funds' beneficiary. In natural parks such as the Retezat Park, alpine refuges or shelters are often private properties that are granted in concession to mountains rescue associations that developed projects that were considered ineligible for European funds by the management authorities

- Some potential investors and current hotel owners, through subsidiaries companies, are venture capital firms such as SIF Transilvania SA (with corporate assets of 335 million Euros). These companies are also ineligible for European funds

- There is a need for the development of common landscape and architecture planning regulation especially for the mountain and spa resorts in the West Region.

4.6.4. Prospects for sectoral development and policy recommendations

Infrastructure and budgets that support the creation of a regional innovation system will facilitate the absorption of knowledge (education and training, advanced services) and knowledge dissemination (technology transfer, ICT, entrepreneurship). The basis of this regional innovation system can be a tourism cluster that will support cooperation between tourist actors and between the tourism sector and different innovation actors. Through its capacity to stimulate public and private infrastructure development according to integrated and multi-sectorial area-based local development strategies, this cluster may become a driving force for the development of related innovative clusters and companies.

During the 2014-2020 programming period, the tourism cluster can act as a platform and implement the smart specialization objectives by using policy to guide the European funds towards tourism integrated and sustainable projects with major externalities.

The three sub-sectorial area-based development priorities can be defined as:

- Spa & wellness tourism
- Urban & MICE tourism
- Ecotourism and active tourism

Spa & Wellness Tourism

The development of spa and wellness tourism in the West region is strongly linked to tourism product development issues. For this purpose, two main initiatives could be pursued.

The first initiative focuses on the creation an *anti-ageing pilot region* in the Western part of Romania. The country is still well known for its expertise in anti-ageing treatments. Meanwhile, the ageing process has become a concern for all EU states. Life expectancy has increased to over 70 years and 2012 was the European year of Active Ageing Intergenerational Solidarity. The European Commission aims to design and adopt special policies in areas like employment, medical care, social services, life-long learning, volunteering, housing, IT and transport services adaptation, in order to support the active role that seniors increasingly play in society and the need to live healthier lives. The

evolution of spa tourism towards anti-ageing and prevention treatments transforms it in a key sector for European policies in the field of active ageing.

The West Region can take advantage of this trend by positioning itself as a pilot region in this field. This can be done through the specialization of town and spa resort treatment facilities towards prevention and anti-ageing treatments that will target seniors. Ana Aslan and Gerovital[44] can constitute a starting base in the area of medical tourism. This offer can be completed by general medical check-ups, aesthetic light surgery, anti-smoking program, anti-alcohol cure, weight-loss program, etc.

The second proposed initiative involves the positioning of the West Region as a cross border medical tourism destination**.** Spa resorts are well known for physical and recovery treatment that are reimbursed by the national, regional private or public European insurance companies. The EU Directive 2011/24/UE, concerning the rights of patients for cross-border healthcare services, has entered in force on the 24th April 2011. This directive creates a general European framework for the delivery of medical services across the EU. The Directive imposes the adoption of national norms for its full implementation starting from October 2013. It can thus represent a development and promotion opportunity for health tourism products in the West Region. The main provisions of the Directive are twofold. First, emergency treatment is covered automatically by the healthcare insurer from the patient's residence country (it requires no pre-authorisation). Second, long-term medical treatments (including medical spa and wellness) in a foreign EU country can be also covered by the insurance company of the patient residence country. In that case, the patient should ask for a preauthorization and the insurance company will reimburse the price in the limit of the amount reimbursed for similar services in the home country.

Overall, the tourism cluster can again play a key role, as it will be able to design customized products for specific markets and to provide information and support to regional spa and medical treatment centers for their certification and accreditation process and help them to access this promising market.

Ecotourism and Active Tourism

Romania's tourism brand strategy[45] identifies (as a result of qualitative and quantitative market studies in 10 European countries) the nature and the countryside as the main competitive tourism advantages of the country.

Rural tourism is the product that represents, in the perception of foreign and domestic customers, the main attractive resource that can compete with foreign destinations. Furthermore, tourism in Romanian rural areas is associated to the notions of authenticity and simplicity.

Ecotourism brings together rural tourism with active and adventure activities and fits with the recent evolutions on the demand side (especially on the European travel market). This form of tourism is based on a bottom-up development approach, providing not only sustainable development and the protection of natural and cultural heritage, but also a maximized local retention of economic benefits.

Romania has already developed, in partnership with the Association of Ecotourism in Romania and the International Ecotourism Society, a list of innovative criteria for certifying eco-tourism destinations. This list of criteria was developed in 2012 and is focused on: i) supporting the involvement of local communities in small investments with important impact: environmental campsites, Greenways trails type, points of information and interpretation of nature and rural life, etc; and ii) assessment and recognition of the first eco-tourism destinations

[44] Romanian cosmetic brands
[45] "Realizarea brandului turistic al Romaniei", Ministerul Dezvoltarii Regionale si Turismului

The West region can become the first Romanian region to develop ecotourism destinations as its natural heritage potential is one the most important of the country. Discussions with tourism stakeholders in the region suggest that, although the influx of tourism to natural parks tends to be low, the share of foreign tourists is a bit higher when it comes to ecotourism and the natural assets of the West Region appear to be highly appreciated by foreign tourists from Serbia, Hungary, Austria, or the Czech Republic.

Urban & MICE Tourism

Urban tourism (business or leisure) has become a key element of wider urban strategy, which encompasses renovation and reconversion of ancient urban areas, economic development, creation and promotion of local brands. In order to capitalize on the potential of the West Region, policy makers could consider two alternative models.

The first one is that of metropolitan areas which have placed the tourism industry and events' management at the center of their strategies. This was the option adopted by cities including Seville, Barcelona, Valencia and Athens. All these cities have in common the creation of a major event such as a launching element or catalyst (Universal Expo in Seville, the Olympics in Barcelona or Turin, European Capital of Culture for Glasgow or Lille). Additionally, these cities have promoted urban renovation; for instance the rehabilitation of the port area in Barcelona for leisure activities, the creation of an adventure park in Seville, the creation of large touristic infrastructure (museum of technics, aquarium, etc) in Valencia, urban renovation in Athens, all with a special emphasis on the touristic and leisure activity.

The second model is the one of metropolitan areas that have invested in leisure tourism, meetings and professional events as part of a broader strategy. Examples include Marseille where the renovation of the port and development of cultural, leisure and touristic activities was a key element of its development strategy. Lyon also figures as an interesting case with investments in the MICE tourism – through the creation of a convention center, renovation of Tony Garnier venue and the construction of a expo park - and also in leisure tourism -obtaining a UNESCO World Heritage Site classification and creating a significant cultural center - the Museum des Confluences. Finally, Hanover is also pointed as a city with a strategy based on business tourism, on fairs and expositions. It is worth highlighting here that the Universal Expo center has obtained important external financing from the EU and Germany.

Regarding MICE tourism, the cultural and event strategy can become a key element to attract tourists in cities that are in a constant search of originality. To this end, having an event agenda that is balanced and includes events in each season is an important aspect for an urban destination. Events are also occasions to discover the traditional heritage of the city presented in a different manner (e.g. light shows on the façade of the Chartres Cathedral). Finally, the creation of major events outside of the main touristic season can represent a good way to increase the tourism circulation during the low season: Strasbourg through its Christmas fairs has succeed to have its highest hotels occupancy rates in December

Policies aiming at strengthening the links with other clusters

Industry clusters can be used as efficient platforms that focus on and quickly contribute to smart specialization objectives by providing and mobilizing the necessary resources and by fostering sectorial and cross-sectorial cooperation to create new competitive advantages in the region. In this context, the linkages between tourism and ITC clusters could be explored as an instrument to promote economic

development. Figure 72 below summarizes the potential connections between these clusters.[46]For instance, in cities like Timisoara and Arad, digital tools could allow the discovery of local heritage and culture using augmented reality that enables: insertion of virtual objects in a sequence of real images; visualization of multimedia content connected to the real environment of a person (audio, video, photo); touristic guidance through visual perspectives; and virtual re-construction of partially destroyed places.

Figure 72 - Potential linkages between ICT and tourism clusters in the West region

Focus on the Tourism Cluster Cross-sectorial cooperation with the existing ICT Cluster of the West region:

Recent developments in Information Technology including the development of Web 2.0, the rapid adoption of smart phones by consumers and the introduction of powerful social media platforms including Facebook, Twitter and You Tube, have led to a convergence of technologies that offer touristic destination, such as the West region an unparalleled opportunity to reach customers. These developments also offer the opportunity to maximize marketing budgets, facilitate strategies that empower tourists to co-create value with service and product providers and develop new transnational opportunities to attract IT savvy tourists. Developing a strong online presence is a necessity for the West region to build new innovative and competitive tourism experiences. In this context, a strong collaboration with the West region ICT cluster, universities and cultural stakeholders is necessary to promote the West region as a tourism destination but also as an investment destination. Indeed, a town for example that is considered as a smart and modern touristic destination is gaining attributes that makes it attractive not only for tourists but also for its inhabitants and the business sector as a whole.

The Facebook travel formula:

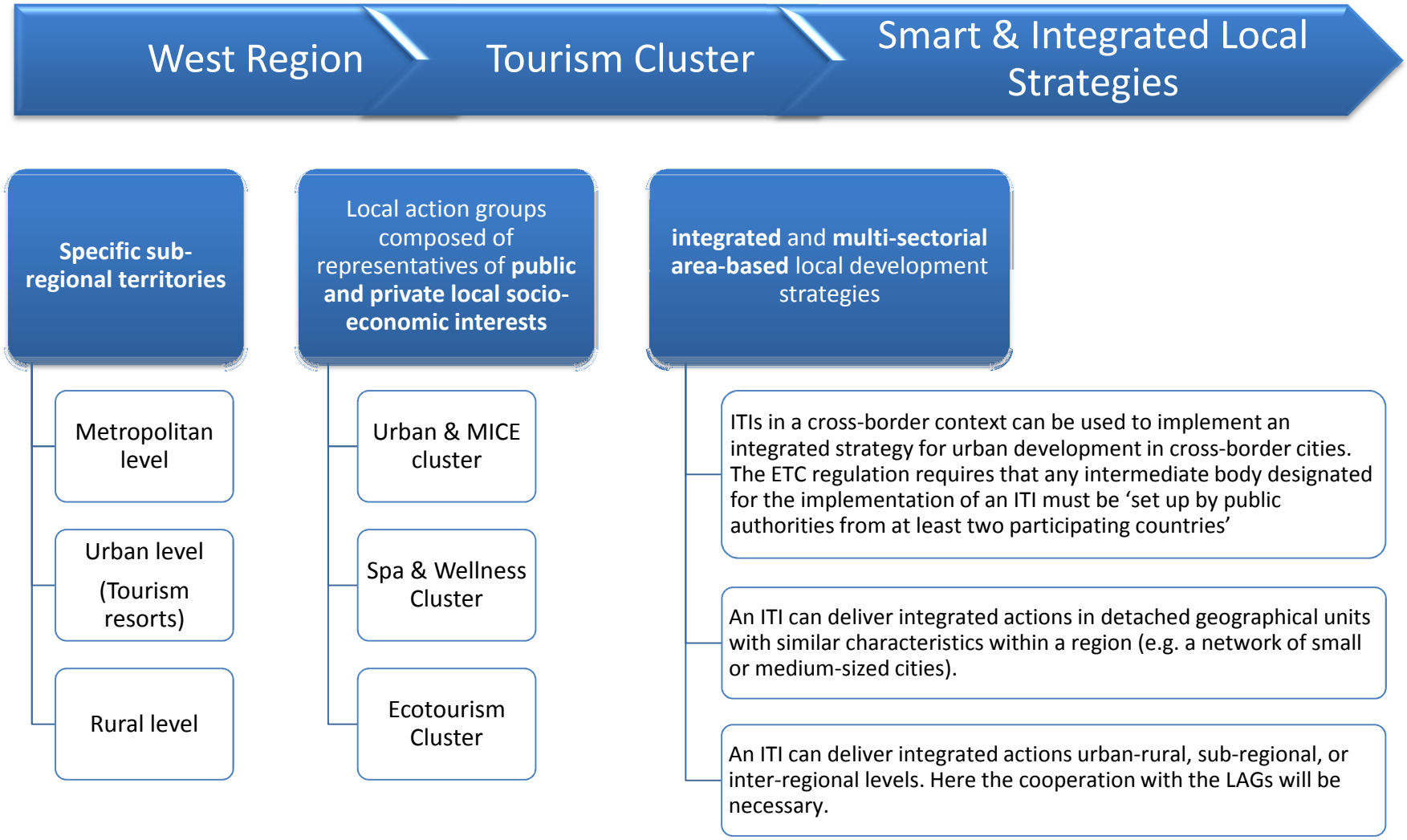
- **52% Say that friends photos inspired their next trip**
- **46% Say that have been invited to a trip via Facebook**
- **45% Say that Facebook makes them visit**

[46] Annex 7 presents an outline for the tourism cluster

Another important strategic function of a tourism cluster will be to sustain the creation of a regional innovation system by providing a market for advanced services and RDTI ecosystem (entrepreneurs, downstream users, universities etc). In the framework of the 2014-2020 programming period, a tourism cluster, by guiding and supporting Public-Private infrastructure investments, would be able to create market opportunities for the related RTDI ecosystem.

For example, the current study has defined three subsectors to be targeted within the tourism cluster: ecotourism and active tourism; spa & wellness tourism; and urban & MICE tourism. In the framework of the 2014-2020 programming period, these three subsectors represent three territorial based strategies which require integrated investments under more than one priority axis or operational programme. These Integrated Territorial Instruments will be carried out through integrated and multi-sectorial area-based local development strategies considering local needs and potential, as illustrated on the next page.

Figure 73 - Integrated local strategies outline for the tourism sector



In the framework of these three multi-sectorial area-based local development strategies, European funding will be available for Private and Public investments. The role of the tourism cluster is to guide these funding towards innovative investments. For example, the Ecotourism "sub-cluster" will support and give guidelines for the creation of a regional network of ecotourism destinations in which the development of green infrastructures, the use of renewable energy, etc. are mandatory because:

- Ecotourists are paying close attention to the use of ecological solutions/products (guesthouse use of renewable energy, ecological and local food, etc.) and to the green certification of tourism providers.
- It is a legal constraint for any activities/infrastructure developed in or around a natural area.
- It is a legal constraint to be certified as an ecotourism destination according to the Romanian law

In the Romanian current crisis context, where all the construction companies endeavor to offer the lowest price and neglect to propose green building solutions, tourism and more specifically ecotourism is one of the few sector where consumers and providers are focused on green innovation products.

Another example can be the spa & wellness subsector that will support and offer guidelines for the creation of a regional network of spa towns that must satisfy clients which are becoming increasingly sophisticated in their demand for specific services. The following figure summarizes the main guidelines for this case

Figure 74 - Potential guidelines for the development of Spa towns

Spa town ecosystem	Common urban planning laws for the spa towns network	Marketing
•Development of local products based on wellness at a small (food, handicraft, etc)and a larger scale such as a water bottle plant or cosmetical and antiageing products based on thermal water •RTDI on the therapeutic factors of thermal water for cosmetics, healing •Creation of tourism and spa training center •Common offer with urban centers or local medical providers •Upgrade of the spa treatment centers	•Heritage preservation and renovation of the Spa Town centers •Development of specific pipes network to provide thermal water in smaller accomodations •Development of the use of thermal water for the town heating system •Development of leisure infrastructure •Green construction •Building and facilities specially adapted to elderly and disabled people.	•Creation of a common brand •ICT destination management solutions •Development of ICT solutions for post treatment monitoring •Development of preventive & personalized health treatment •Common agreement with foreign Tour operators •Certification and accreditation of spa treatment centers

Overall, the tourism cluster would bring key elements to metropolitan and urban areas integrated territorial investment strategies, especially in the context of urban renewal projects and cultural and event projects that may be financed during the next programming period. The development of MICE tourism will be a priority for the reasons previously discussed(increased revenues from tourism , lower seasonality, etc.) but also because hosting international events allows local students, teachers or entrepreneurs to gain access to the latest developments in their field of activity and to enter in contact with foreign partners. Therefore, an ambitious MICE development strategy can be used by emerging regions and countries to sustain the transfer of knowledge.

In sum, tourism is an underdeveloped sector that must be sustained by an integrated territorial development strategy during the 2014-2020 programming period. European funds will be necessary to finance public infrastructure investments that are necessary for the development of the private sector.

Due to the lack of a common regional tourism actor, a public-private tool must be created, a tourism cluster, to assist public and private actors to prepare and implement the future programming of EU funds for the period 2014-2020, especially the Regional Operation Program. The tourism cluster will promote the financing of tourism-related investments such as trans-sectorial projects with horizontal and vertical positive externalities. Some examples of such investments/projects (public or private or both) include: accessibility infrastructure and historical heritage renovation. These assets need to be included in smart PPP schemes to be managed by private owners; The development of cruise tourism through the urban renewal of regional Danubian port cities can help the West Region take advantage of this important natural asset. A common and integrated planning strategy is necessary for the renovation of spa towns resorts that will include a financing line dedicated to this type of renovation and for the extension of spa treatment facilities. Moreover, a common and integrated strategy is also needed for the creation of a network of ecotourism destinations conform to the Romanian law in the West region. The modernization of the Arad exhibition Center and the creation of cultural landmarks in the main cities such as a Museum of technics in Timisoara, can also contribute to the development of urban tourism in the region. Financing will also be necessary for the organization of a diverse set of cultural events as well as for the creation of greenways and their linkage to Euroveloroutes – the highly popular European network of greenways that “theoretically” cross or end in Romania. Until now, no public investment has been made in in this area and the tourists, coming from upstream countries, usually stop their journey in Serbia.

5. Concluding Remarks

The West Region is the wealthiest in Romania apart from the Bucharest-Ilfov area, in terms of per capita GDP. Although the degree of economic well-being varies significantly across the four counties (Timis, Arad, Hunedoara, and Caras Severin), continuous improvements in development levels can be interpreted as a signal for the region to shift its focus to higher value added activities, particularly in potential knowledge-hubs like Timisoara and Arad.

In this context, RIS3 policies should focus on increasing the knowledge content and value added of existing production in industries where comparative advantages exist, and facilitate the development of new economic activities through measures which support entrepreneurship and experimentation.

The goal of the current analysis was to provide an assessment of the strengths and weaknesses of the West Region economy at a detailed sector level. Building on these findings, the report aims to recommend areas for policy action and to inform investment priorities to be considered under the 2014-2020 programming period.

In order to develop an efficient and growth-enhancing policy framework, the authorities should be guided by the available information regarding the economic specialization of the region. For sectors in which evidence suggests that the West Region has an apparent or latent comparative advantage, targeted R&D and innovation policies can help the industry maintain or 'unleash' existing competitiveness (vertical interventions). At the same time, the government should strive to create a business environment that supports entrepreneurship by focusing on areas such as: access to information, skills and training, infrastructure, credit markets, and the accumulation of knowledge (horizontal interventions).

In the current report, the economic specialization of the West Region was examined and the sectors under analysis were classified in terms of comparative advantages. **Based on available information in the market, the region has apparent comparative advantage in focusing on automotive, textiles and ICT, while agro-food and tourism were classified as sectors with latent comparative advantage. Finally, the construction sector was classified as a sector with unclear comparative advantage.**

In addition, for each sector under analysis, some specialization niches were identified. In this regard, it is worth emphasizing that this "identification exercise" is essentially evidence based and simply reflects the main trends emerging from the (INS) data analysis; and to the extent possible it does not involve the ad-hoc selection of particular activities based on any exogenous (and potentially biased) criteria.[47] The following table summarizes the high growing subsectors (NACE 4 digit) that have emerged from data analysis.

[47] Therefore, the identification of specialization niches must be caveated by the available time frame: as the INS data covers 2008-2010 time horizon, the analysis reflects the immediate post crisis scenario and, for this reason, should be cautiously interpreted.

Table 19- Specialization opportunities

Sector/Cluster	Opportunities
Auto	Manufacture of Other Electronic and Electric Wires and Cables, and Manufacture of Other Rubber Products, new solutions for mechanical engineering, motor vehicle transport, etc.
Textiles	Manufacture of Underwear, Manufacture of Other Textiles N.E.C., Manufacture of Other Knitted and Crocheted Apparel, and Manufacture of Non-Wovens and Articles Made From Non-Wovens, Except Apparel, new solutions for mechanical engineering, CAD or Computer-aided design, etc.
ICT	Manufacture of Communication Equipment; Manufacture of Computers and Peripheral Equipment; Other Information Technology and Computer Service Activities; Data processing, hosting and related activities; Computer programming activities; Web portals; Computer programming activities; networks of the future, networked marketing and media and 3d internet, flexible organic and large area electronics, personal health and preventive care systems, research and innovation IT network, etc.
Agro food	Collection, Marketing, Processing and Preserving of Meat, Fruit and Vegetables; Crop science and food biological science, food procession bio technologies, etc.
Construction	Engineering and technology, energy efficiency materials, innovative building materials, joining technologies, conversion of wood waste, conversion of hard coal waste, environmental engineering, among others
Tourism	Spa & wellness tourism; Urban & MICE tourism; and Ecotourism and active tourism, Natural resources for anti- age and medical tourism, etc.

It is worth emphasizing that the identification of specialization opportunities for each cluster/sector is limited at the level of NACE 4-digit activities. It does not encompass products. Two main explanations lie behind this approach. First, the firm level data that was used for this analysis does not provide information on the set of specific products that are produced by each firm. The SBS dataset includes only the NACE sector under which the firm is classified. Second, since the analysis is focused at the region level, which limits the universe of firms under examination, any selection of products for potential specialization would inevitably imply the "selection" of a very small number of firms.

Whereas the firm-level data analysis has pointed to these high growth subsectors, the suggested specific areas for policy intervention will focus primarily on actions that can enhance growth potential at the level of the sector as a whole. This is because interventions focused on subsectors at the NACE 4-digit level would inevitably benefit a very small number of firms. In this regard, it is worth stressing that policy makers must avoid using a "picking winners" approach since the role of a smart specialization strategy is to promote the role of the knowledge factor to economic growth, and to act as a flexible system that endorses iterative learning, but not to focus on specific economic activities.

To the extent that distinct degrees of information about economic specialization imply different chances of success with policy targeting, the following sections suggest general areas for policy action that aim to enhance the growth potential of the region. Some of these suggested areas encompass horizontal bottlenecks that are common to all sectors, while other are sector specific. **The Final Report will take a more practical approach and, following the thematic objectives established by the European Commission for the 2014-2020 programming period, will propose investment priorities that best fit the specific development needs of the West Region.**

5.1. Horizontal Policy Areas

- ***Expansion and improvement of vocational school system focused on industry-relevant training***

The West Region is recognized as having a strong set of universities and hosts a large student population, particularly in Timisoara. As Table 20 shows, the West is particularly well represented in terms of the number of tertiary institutions and faculties that it hosts. However, although it also has a fairly large population of students in the first stages of tertiary education, the West does not stand out as having any particular advantage over peer regions. The West's performance diminishes considerably in the advanced stages of tertiary education, where the relative levels of its research student population is only half that of the North West and one quarter that of Bucharest. Taken together this suggests that the region is in a broadly good position in terms of producing (theoretically) trained workers for high skill professions, but may be less competitive in the higher end of research and innovation.

Table 20.Tertiary Education Infrastructure as of 2010

	Tertiary institutions		Faculties		High skills students (level 5 A)		Advanced research students (level 6)	
	Total	***per m population***	**Total**	***per m population***	**Total**	***per m population***	**Total**	***per m population***
West	**14**	**7.3**	**79**	**41.3**	**92,419**	**48,290**	**2,179**	**1,139**
North West	17	6.3	97	35.7	114,473	42,124	6,554	2,412
Centre	13	5.2	75	29.7	120,125	47,618	2,267	899
Bucharest	34	15	166	73.2	366,663	161,709	10,563	4,659
Romania Total	108	5	624	29.1	969,990	45,297	28,963	1,353

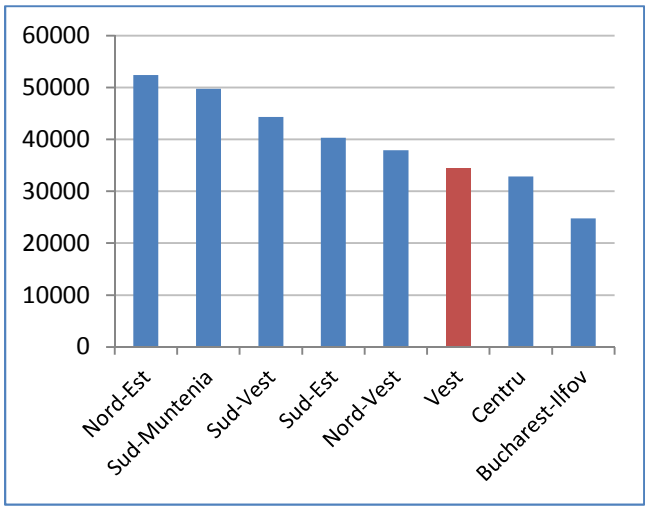
Sources: Institutions and Faculties from Institute of National Statistics; Student figures from Eurostat; "High skills students" defined as "First stage tertiary education, programmers that theoretically based/research preparatory or giving access to professions with high skills requirements (level 5A)"; "Advanced research student" defined as "Second stage of tertiary education leading to an advanced research qualification (level 6)"

Consultations with businesses conducted as part of this assessment have revealed that the very small number of vocational schools in the region (and in the country) has had a significant negative impact on the ability of firms to increase productivity or to expand. The number of technicians who can operate advanced machinery and equipment is decreasing rapidly and their average age is increasing. This problem affects all the sectors that were evaluated during this study, including textiles, agri-food, automotive, or construction, although to a lesser extent ICT (particularly software development, which is primarily a high-skill sector). Moreover, a number of companies complain that many of the training programs offered by human resource service providers and sponsored by EU funds have not been of poor quality and not relevant for the market.

In order to support a sustainable industrial development in Romania for the medium and long term, it is critical that policy makers focus on the upgrade and development of technical and vocational learning institutions. Romania has a long tradition on Technical and Vocational Education and Training (TVET). The TVET program has been under a restructuring process that began with the assistance of the European Union Phare VET RO 9405. In 1998, authorities at the national level established the National Center for Technical and Vocational Education and Training Development to continue the reform of the TVET program. The Center is a public institution which is responsible for: developing TVET policies and strategies, developing TVET qualifications and curriculum; improving and assure quality, planning the TVET training offer, and supporting the TVET system and schools to develop and implement innovative

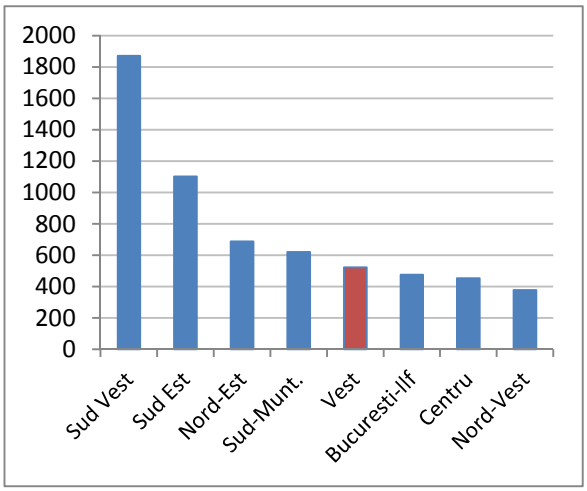
projects. Recent numbers from INS show that West region lags behind other peers in terms of enrollment in TVET programs.

Figure 75 -Number of students enrolled in technical education (2011)



Source: Institute of National Statistics

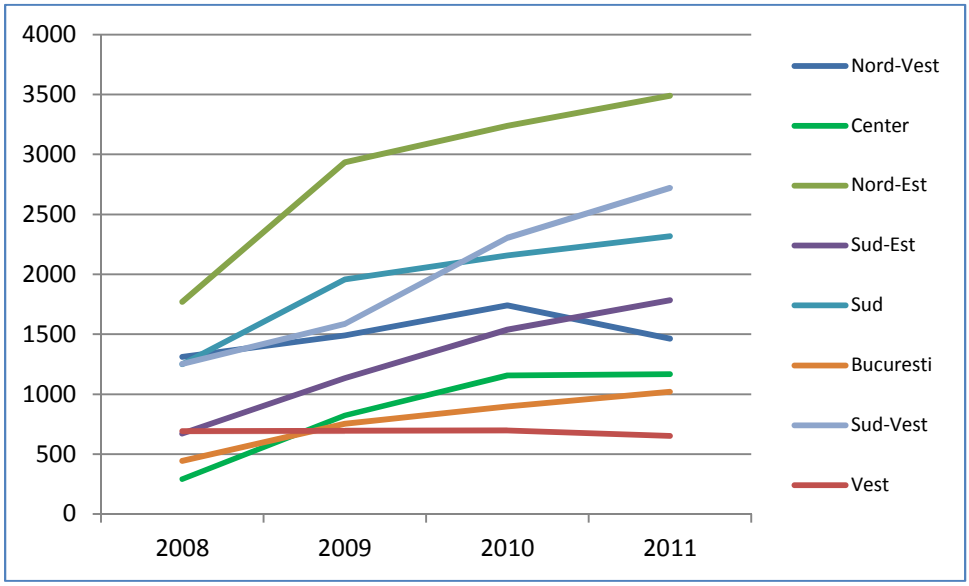
Figure 76 -Number of students enrolled in foremen education (2010)



Source: Institute of National Statistics

Data shows that in 2011 the West Region had the third lowest number of students enrolled in technical high schools of all the regions in Romania (34, 441), and in 2010 was the fourth region number of students enrolled in foreman education (523). In addition, between 2008 and 2011, enrollment in agricultural high schools has remained constant and was in 2011 the lowest of all the regions in Romania (6522 students).

Figure 77 -Number of students enrolled In agricultural high schools (2008 – 2011)



Source: Institute of National Statistics

In addition to increasing overall enrollment in TVET programs, policy measures should ensure that the curriculum is designed based on the private sector needs, as a way to tackle one of the main bottlenecks for skills development, particularly in the manufacturing sector.. In addition, the students should have access to modern machinery in order to be able to obtain industry-relevant knowledge. This approach will ensure that new graduates acquire a skills set that meets the demands of the market and that they are successful in finding employment.

- ***Supply of entrepreneurial and business management skills training***

A concern highlighted in interviews with R&D stakeholders as well as with the private sector, was the lack of entrepreneurial and business management know-how. For example, in many cases engineers or researchers do not have the ability to translate innovative ideas into commercially viable projects. Similarly, existing small firms or local producers which aim to become suppliers for multinationals are not successful in presenting their products in an attractive manner or creating a brand.

Business development and management training programs are essential in preparing firms and entrepreneurs to compete on a national and global level. This type of training should be offered through the university curricula (including a focus on presentation skills), as part of incubator services, or be provided to entrepreneurs through specialized programs at the local level.

- ***Improvements in local (road and rail) transport infrastructure***

The report "Territorial Assessment: Profile, Performance, and Drivers of Growth in the West Region" has shown that while the West Region does not face a major infrastructure deficit, strategic investments in infrastructure, particularly in transport infrastructure, will be critical in addressing both parts of the strategic challenge. Three main types of connective infrastructure need to be considered. First, infrastructure is necessary to support the productive capacity of the Timisoara-Arad agglomeration. Among the key issues here will be to improve access to the agglomeration to expand the pool of labor that can commute to businesses in the agglomeration; to improve links (including, e.g. rail) to allow for more efficient daily exchange between Arad and Timisoara; to improve accessibility to the air transport infrastructure; and to continue investments aimed at improving the wider quality of life of residents in the agglomeration, with the aim of making conurbation increasingly attractive to high skilled workers. Second, infrastructure is needed to facilitate connectivity between Timisoara-Arad and more peripheral parts of the region. Recent investments by some of the existing large automotive companies to establish second plants in Hunedoara and Caras-Severin suggests there may be scope to attract significant labor intensive production in lagging parts of the region. As part of 'two-tier' strategies by some of these multinationals (where they concentrate research and other high skill activities in Timisoara-Arad and shift labor intensive production to other parts of the region) this obviously represents a huge opportunity to address both sides of the regional challenge. Improving transport connectivity of these regions so that shifting managers and engineers back and forth between regional head offices / technical centers and plants will be important to make such a strategy effective. There may also be a need to invest in industrial infrastructure and/or improve the operating efficiency of existing industrial parks. Third, investments should also target infrastructure to improve the region's connectivity with Bucharest. While the region has long benefited from its westward orientation, the increasing pull of Bucharest in the national context makes it increasingly important for the West to

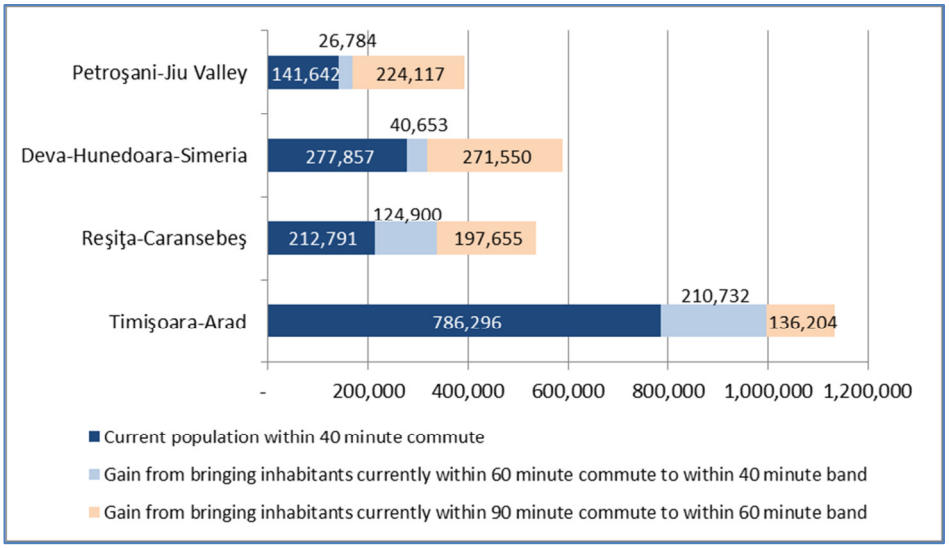
improve its physical connections and its network to Bucharest – key to this is addressing the still major transport infrastructure gaps.

Overall, the region is disconnected from Bucharest and the rest of the country as virtually every settlement in the West Region is closer to either Budapest or Belgrade than they are to Bucharest, and infrastructure connections to the capital (and the rest of the country) remain poor. Major projects like European Corridor IV will play an important role to improve connectivity, not only to Bucharest but also to neighboring regions and cities like Sibiu. This may be particularly important for the lagging eastern parts of the region, which are also distant from other European capitals. It may also be important to support the growth and diversification of the region's exports toward locations like Ukraine, Turkey, and Russia.

Analysis presented in the World Bank report "Economic Geography Assessment: Territorial Development Challenges in the West Region" has shown that improving internal connectivity with the region's main urban agglomerations, most importantly with the Timișoara-Arad conurbation, is one of the most important challenges in addressing territorial disparities in the West Region. This involves both looking at ways to expand the catchment areas of urban centers to absorb a wider commuting workforce in the region, as well as improving general connectivity to allow businesses, workers, and consumers in the region to benefit from access to a larger market. Overall, the region is relatively well positioned for access to the Timisoara – Arad conurbation, with almost all the western half of Timis and Arad counties – the majority of the region's population – within a one hour road commute. Moreover, leveraging the rail network could offer the region a significant comparative advantage. Estimates show that Timisoara has the largest population outside of Bucharest within a one hour commuting distance.

Comparing the potential impacts of improved connectivity across the four main agglomerations in the region (see figure below) suggests that while the biggest economic impact would probably come from improving connectivity to Timisoara – Arad for those currently living between 40 and 60 minutes from the conurbation, a similar connectivity improvement would have an even greater relative impact on Resita – Caransebes. Improvements in local connectivity, by contrast, may have a limited impact in the Hunedoara agglomerations, which would gain more from improving broader connectivity with the rest of the region and outside it.

Figure 78 - Potential Impact of Connectivity Improvements on the Population within Commuting Distance of Main Agglomerations in West Region



Interviews with firms in all the target sectors have confirmed the need to improve infrastructure connectivity as an important aspect to unleash the growth potential of the region. The poor quality of the local road infrastructure affects firms in all sectors. Companies which use their own vehicles for transportation of products or supplies mention the increased wear and tear of the trucks and delays in delivery, leading to increased costs and loss of competitiveness. In addition, transportation of workers is problematic for large scale manufacturing activities. A large proportion of blue collar or low skilled workers commute to the production plant from surrounding areas and often there are no public transportation options available to them. Large companies provide transportation for employees using company buses but this leads to increased production expenses and traffic congestion.

Authorities should focus their attention on enhancing the quality of the roads in rural and remote areas, which will not only improve the access of the population in these locations to urban centers but could facilitate the expansion of manufacturing activities to more impoverished areas of the West Region. The new infrastructure could also support the development of ecotourism activities in natural and national parks. In addition, constructing a ring road for the city of Timisoara and extending the connection with the highway would reduce transportation time and costs. Moreover, extending the network of public transportation to better serve the needs of the companies in the region and of their employees would make the region more attractive to potential investors.

While tackling infrastructure gaps should be an important part of the region's short term strategy, it is worth stressing that the returns of infrastructure investment are likely to diminish as region's development increases. Thus infrastructure investment needs to be limited in time, respond to clear criteria of need and development potential, and be matched by similar efforts aimed at the improvement of human capital and at addressing institutional bottlenecks.

- ***Access to Finance***

Discussions with the private sector in the West Region indicate that many firms perceive the lending conditions and interest rates required by banks in Romania as a significant constrain to growth. The amount of collateral necessary for EU co-financing can be prohibitive for smaller firms. As a result of these financing conditions, many companies opt to use internal funds to purchase new machinery and invest in technological upgrading. However, this approach does not allow most businesses to grow at a sustained pace and limits their capacity to expand operations and compete within a larger European or global market.

A significant proportion of the companies in the West Region interviewed as part of this evaluation mentioned that they had used European Structural Funds between 2007 and 2013 and expressed their intention to apply for this type of financing in the upcoming programming period (2014 – 2020). However, the consultations highlighted a number of challenges regarding to access to EU funds. Some firms consider this type of financing unaffordable because it requires significant co-financing, which may be difficult to obtain from the banks (see above). The application procedures often lack transparency, and national or local authorities may impose additional requirements that can render the process lengthy and cumbersome. Additionally, the evaluation period for an application can be very long. Companies that apply for funds to invest in new equipment can wait more than a year for the decision, which in some industries can render a particular technology obsolete. In addition, other firms complained that reimbursements for investments pre-financed by the company may extend past the date specified in the contract.

In order to provide effective support to the private sector and help to nurture sustainable growth, EU Funds should be made available based on clear and transparent guidelines, which take into account market dynamics and which are applied in an efficient manner by officials with basic knowledge of the industry. The evaluation process should be streamlined so that funding decisions are communicated to applicants within a reasonable period of time. Reimbursement of funds should be processed in an expedite manner so as to avoid the potential negative impact which this type of delays can have on a firm's cash flow and operations.

- ***Improving the Institutional Framework to Support Innovation***

The research undertaken at knowledge generating institutions, predominantly the RDIs, does not seem to be marketable, nor does it meet the demands of the private sector. The region should consider consolidating the existing RDI system and increase the quality of research in the remaining institutes. Privatizing some of the RDIs and channeling of funds away from basic research and towards more the "innovation" side will be beneficial.

To fulfill the target of intensifying private sector's collaboration with the research institutions (universities and RDIs), the region may benefit from carefully designed innovation offices. Technology transfer may take the form of a licensing agreement between the academic researcher and a private firm, or a spinoff company established with participation of the main scientist involved in the project. Targeted innovation offices, either in-house within the universities or sector-specific for the key economic activities may be useful in carrying academics' ideas to the market. The functions of such offices should be carefully designed, with caution to refrain from creating yet another layer in the bureaucracy, additional paperwork and delays for the researchers. The sole function of a targeted innovation office should be to facilitate the commercialization of the academic research, carrying applied researchers' ideas to the market and also promoting applied research within the universities and RDIs.

In terms of alleviating the burden of acquiring intellectual property protection for inventions, co-financing of patent applications can be a feasible means of support in the light industry, construction and energy efficiency sectors, where relevant RDIs have reported to have made some attempts at protecting the intellectual property generated within the institute, but have been unable to cover the full costs of the patent application.

Rather than building new infrastructure to host startup companies, emphasis should be made on developing high value added services in existing infrastructure facilities in the region. Institutionalized mentorship schemes, sponsored networking and training programs may be considered among such activities. An immediate sectoral application of an incubation facility with institutionalized training, mentoring and networking functions can be in the ICT sector, since there is an existing community in place for supporting startups in this field. There are already well established entrepreneurs that grew from the UBIT incubator, whose directors may consider mentoring activities. Local angel investors could also be considered as potential mentors.

The West Region is capable of equipping university students with good technical skills, competitive at the level of world best practices. In order to complement this technical skill with practical experience in modern laboratories abroad, the region can consider scholarship programs designed to send students for postgraduate study or internships abroad, with the conditionality of returning to a home institution upon completion of their studies.

Local financiers of innovation expressed interest in establishing a seed fund to invest in regional innovative activity. This initiative may be coupled with regional resources to generate a fund-of-funds structure which can be designed to re-invest part of the proceeds from successful projects.

5.2. Sector-Specific Policy Areas

Each sector (automotive, textiles, ICT agro food, construction and tourism) has its own constraints and specificities which define the overall challenges that will shape the future development of specialization niches.

For auto sector as a whole, the overarching challenge is to diversify towards higher value activities, which requires moving up a very hierarchical structure under the international value chain. In this case, key conditions to upgrading are the creation of a well-developed base of local suppliers, with capable management and able to produce high quality parts and components; a well-developed labor market, producing highly skilled but relatively cheap technical experts; and a system of local R&D and innovation to develop prototypes or to produce customized parts and components.

For textile sector, the challenge is also to increase value added Hence the best way to upgrading for West Romania firms is to move upstream or downstream from central low value added activities and to build the skills and capacities for firms to start producing their own design or brand.

For the agro-food sector, given the complex – and increasingly global – features of the agro food value chain where the largest share of innovation (and value added) is generated by buyers, improving the marketing of the local products and establishing linkages with large distribution chains seems to the main challenge in the short term. In the long term, value added upgrading sector should be accompanied by efforts in applied R&D as global experience shows that those countries which managed to obtain the biggest value addition from their food production invested heavily in basic and applied research.

For the ICT sector, given its well-known spillovers effects particularly over the users of their products and services, the challenge is to: enhance the pool of skilled labor, which is in shortage in the region; creating a good environment for startups; develop business accelerators and adapt incubators to the needs of the ICT sector; increase internet connectivity; help firms connect with global customers; enhance linkages and interactions with downstream (user) sectors; improve the patenting policy.

For the construction sector, the rates of activity have decreases steadily since 2008 as a result of the economic crisis. As a result of the retrenchment in private sector investment, the government has become one of the most important clients for construction companies in the West Region. Discussions with companies in the sector suggest that over the past few years, government infrastructure contracts, which have been awarded primarily according to the *lowest price technically acceptable* criteria**.** Against this background, the use of, often costly, energy efficient materials and technologies, although encouraged by the European Union, is not yet widespread in the region as construction firms are highly dependent on the client market.

For tourism sector – increased attention at the political level is key if the West Region is to take full advantage of its natural and cultural endowments. The lack of destination management organizations at regional, county and local levels reflects the absence of a common integrated strategy which has negative consequence including an unjustified competition between complementary destinations such as Timisoara and Arad. Unclear ownership rights for the historical and cultural patrimony which can result in restricted access to European funds due to ownership problems and non-eligibility of concession grants by the management authority. Other bottleneck include reduced public administrative capacity for complex investment tourism-related projects, and the lack of regional integrated tourism products to be sold on local and foreign tourism markets

5.2.1 Automotive

- ***Establishment of research institutes and testing laboratories***

In order for the automotive sector to continue to grow in the medium term and remain globally competitive, firms in the West Region must increase levels of value added through the incorporation of more knowledge and technology in production. Although there are many foreign MNCs in the region, the transfer of technology and knowledge to local firms is insufficient, mostly due to the nature of the tasks undertaken by local firms. Establishment of research institutes and labs will incentivize local firms to prepare prototypes, test their new designs, products and processes and help them to become included in the global supply chain of MNCs. Once a firm becomes part of a supply chain, learning and spillovers are likely to be accelerated. The labs will also provide opportunities to conduct more frequent quality tests which will increase reliability of local producers.

- ***Increasing awareness regarding the activities of the auto cluster***

Expanding and increasing the awareness of the auto clusters initiatives (like the Automotivest) would stimulate exchange of ideas, sharing of experiences and would help local producers become better and more connected with the large players.

5.2.2 Textiles

- ***Tax incentives, subsidies, and better financing terms on productive investments in new technology and machinery***

In order to increase the value added generated by the sector, and to be able to enter new export markets, textile firms in the West Region should expand their production to include more knowledge and technology-intensive activities that will allow them to generate new designs and products. These activities will require the use of advanced technology and equipment that can be prohibitively expensive for many local companies, which have difficulties in accessing external finance. To close this gap on financing, the government can provide tax incentives, subsidies, or better financing terms on productive investments, especially on acquisitions of new technology and machinery.

5.2.3 Agro food

- ***Sector-Specific Support Infrastructure***

The authorities should develop targeted initiatives for SMEs to supporting the development of infrastructure for improving quality, health and safety standards, SMEs financing initiatives, marketing initiatives such as the development of a regional brand, or training in marketing, sales, etc. These measures will help build capacity in the sector and could be very helpful in enhancing the competitiveness of West Region food producers. Measures to support the association of small scale farmers could greatly improve access to finance, production sustainability for food processors, lower food processing costs and help to provide more robust employment in rural areas.

- ***Basic and Applied Research***

The largest share of innovation and value added in the agro food sector is generated by suppliers through the provision of new machinery, new seeds, new chemicals and fertilizers, and more recently by the application of ICT to agriculture. Therefore, public policy should support innovation in the industry, especially as food engineering, agriculture, and veterinary sciences are areas of strength of the West Region universities.

5.2.4 ICT

- ***Incubators and business accelerators***

While there is agreement regarding the usefulness of incubators and business accelerators, it was highlighted during discussions that in order to be useful these infrastructures also need to provide other services, such as information about the sector and the clients, assistance in drafting business plans, and advice regarding financing options.

- ***Mentorship programs***

Mentorship programs should be structured more efficiently, as the incentives for mentors have to be clear. These incentives can take the form of shareholding, or the right to subsequently participate in the ownership and management of intellectual property. Mentors also facilitate the firms' access to investors. There are different successful models for this type of activity, some of them (such as Endeavor) which operate in different countries and could be franchised to Timisoara.

- ***Angel investors***

In Timisoara there are several potential investors (i.e. angel investors) who are experienced, skilled and well-connected individuals that could provide hands-on support to entrepreneurs. There is space for public action to research the market and connect investors to new creative companies in need of funding.

- ***Links with global customers and with downstream user sectors***

Match-making mechanisms and more efforts to market the West Region ICT sector to downstream users and global customers would also be necessary.

5.2.5 Construction

- ***Policies to support the regional construction and energy cluster (ROSENC)***

The West Region cluster ROSENC can play a key role in promoting collaboration between state authorities, academia, and the private sector in order to encourage knowledge –exchange and support commercially sustainable projects to expand the production of energy efficient construction materials in the region, which could help reduce the cost of such inputs and increase their use in local infrastructure. Thus, increasing awareness regarding ROSENC's initiatives could help local firms increase competitiveness.

- ***Expanding the award criteria for government infrastructure tenders to include the use of energy-efficient materials***

The authorities should encourage the use of energy-efficient materials in government infrastructure projects and should support the transition to nearly zero energy buildings. These measures would promote the use of energy efficient materials while helping sustain long term economic development.

5.2.6 Tourism

A tourism cluster can support cooperation between tourist actors and between the tourism sector and different innovation actors. Through its capacity to stimulate public and private infrastructure development according to integrated and multi-sectorial area-based local development strategies, it can become a driving force for the development of related innovative associations and companies. The tourism cluster can act as a platform during the 2014-2020 programming period that can implement the

smart specialization objectives by using policy tools such as the Integrated Territorial Instrument (ITI) to guide the European funds towards tourism integrated and sustainable projects with major externalities.

Spa and Wellness Tourism

- ***Anti-aging pilot program***

The West Region could position itself as a pilot region in the field of anti-aging treatment. This can be done through the specialization of town and spa resort treatment facilities towards prevention and anti-ageing therapy that will target seniors. Ana Aslan and Gerovital can constitute a starting base in the area of medical tourism. This offer can be completed by general medical check-ups, aesthetic light surgery, anti-smoking program, anti-alcohol cure, weight-loss program, etc.

- ***Promotion of spas as cross-border medical tourism destinations***

The tourism cluster could manage the design of customized products for specific markets and could provide information and support to regional spa and medical treatment centers for their certification and accreditation process.

Ecoturism and Active Tourism

- ***Promotion of the region's ecoturism potential***

The West Region can become the first Romanian region to develop ecotourism destinations, as its natural heritage potential is one the most important of the country. Ecotourism brings together rural tourism with active and adventure activities and fits with the recent evolutions on the demand side (especially on the European travel market). This form of tourism is based on a bottom-up development approach, providing not only sustainable development and the protection of natural and cultural heritage, but also a maximized local retention of economic benefits.

Urban and MICE Tourism

- ***Focus on events management and investments in leisure tourism, and organization of meetings and professional events***

Successful metropolitan areas have placed the tourism industry and events' management at the center of their tourism strategy or have invested in leisure tourism, meetings and professional events as part of a broader strategy.

- ***Promotion of a cultural and events agenda***

The cultural and event strategy can become a key element to attract tourists in cities that are in a constant search of originality. Having an event agenda that is balanced and includes events in each season is an important aspect for an urban destination. Events constitute occasions to discover the traditional heritage of the city presented in a different manner. In addition, the organization of major events outside of the main touristic season can represent a good way to increase tourism flows during the low season.

Role of a Tourism Cluster

In the framework of the 2014-2020 programming period, a tourism cluster could guide and support Public-Private infrastructure investments. The role of the tourism cluster is to guide the available funding towards innovative investments. For example, the Ecotourism "sub-cluster" will support and give guidelines for the creation of a regional network of ecotourism destinations in which

the development of green infrastructures, the use of renewable energy, etc. Similarly, for the Spa and Wellness subsector, the cluster could support and offer guidelines for the creation of a regional network of spa towns that must satisfy market demands. Moreover, the linkages between tourism and ITC clusters could be explored as an instrument to promote economic development. For example, in cities like Timisoara and Arad, digital tools could allow the discovery of local heritage and culture. In addition, the tourism cluster would bring key elements to metropolitan and urban areas integrated territorial investment strategies, especially in the context of urban renewal projects and cultural and event projects that may be financed during the next programming period.

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Annex 1 –Definition of Sector Clusters

Among all NACE activities covered by the SBS dataset, some specific sector clusters deserve particular attention: ICT, automotive; agro-food; textiles and leather; tourism; construction; energy; and health. The following tables display the precise NACE 2 description of each one of them, following consultation with ADR Vest. It is worth acknowledging that since information on NACE 2 sector is available only for the 2008-2010 period, all cluster analysis is restricted to this time period.

Table A1.4. ICT cluster: NACE 2 sector list

Sector	NACE CODES	Comments
ICT	261	all (Eurostat definition)
	262	all (Eurostat definition)
	263	all (Eurostat definition)
	264	all (Eurostat definition)
	268	all (Eurostat definition)
	474	all (our definition)
	582	all (Eurostat definition)
	611	all (our definition)
	612	all (our definition)
	62	all (Eurostat definition)
	63	all (Eurostat definition)
	582	all (Eurostat definition)
	951	all (Eurostat definition)

Table A1.6. Agro-food cluster: NACE 2 sector list

Sector	NACE CODES	Comments
Agro food	011-016	all (agriculture)
	03	all (fishing&acvaculture)
	10	all (food processing)
	11	all (beverage)

Table A1.7. Textiles and leather cluster: NACE 2 sector list

Sector	NACE CODES	Comments
Textiles&leather	13	Manufacture of textiles (all without 1392)
	14	Manufacture of wearing apparel
	15	Manufacture of leather and related products

Table A1.5.Automotive cluster: NACE 2 sector list

Sector	NACE CODES	Comments
Automotive	1392	textile article but no clothes (optional choice)
	2219	fabrication rubber products
	2222	fabrication plastic products
	2229	fabrication plastic products
	2433	steel processing
	2511	metal processing
	2550	metal processing
	2572	metal processing
	2573	metal processing
	2593	metal processing
	2732	wires production
	2740	electric lightning equipment
	2790	electric equipment
	2822	equipments
	2841	tools making
	2849	equipments&tools making
	2892	equipments&tools making
	2899	equipments&tools making
	29	all (car manufacture)
	3299	industrial activities

Table A1.8. Tourism cluster: NACE 2 sector list

Sector	NACE CODES	Comments
Tourism	55	all (country definition)
	56	all (country definition)
	79	all (services regarding tour-operators&booking)
	932	all (services regarding entertainment)

Table A1.9. Construction cluster: NACE 2 sector list

Sector	NACE CODES	Comments
Construction	41	all (country definition)
	42	all (country definition)
	43	all (country definition)

Annex 2 - List of RTDI interviews

A set of interviews with RTDI actors was conducted over the period of November 2012 and April 2013 as part of the current analysis. The list below presents the complete set of interviewed institutions.

National R&D Institutes (5) and Universities (5)

- RDI Welding and Material Testing
- RDI for Construction, City Planning and Sustainable Territorial Development - URBAN INCERC
- RDI for Industrial Ecology ECOIND - Timişoara branch
- RDI in Mine Safety and Explosion Protection (Petrosan)
- RDI for Electrochemistry and Condensed Matter – Timişoara
- Universitatea de Vest din Timişoara
- Banat's University of Agricultural Sciences and Veterinary Medicine Timişoara
- Universitatea "Politehnica" din Timişoara
- Universitatea de Medicină şi Farmacie Victor Babeş UMFT
- Universitatea Aurel Vlaicu din Arad

Public Authorities (3)

- National Authority for Research (NASR/ANCS)
- County Council Hunedoara
- City Hall Arad

Actors in Innovation Infrastructure (5)

- Technological and Industrial Park Timişoara (PITT)
- Timişoara Software Business Incubator (UBIT)
- TTO- The Regional Centre for Innovation and Technological Transfer (TEHIMPULS)
  Hunedoara Industrial Park
- Arad Industrial Park
- Start up hub (Private, City Business Center)
- E-Austria Institute

Private companies (12)

Early stage financing: angel investors (4)

Academic entrepreneurs (2)

Annex 3: NASR-administered projects[48] in the West region

Table A3 1- Administered projects in the West region

Total number of applications	Applications by private actors	Applications by RDIs	Applications by universities	Joint applications by universities & private actors
36	20	2	10	4

Table A3 2- Applications to NASR-funded projects by key intervention area

Key area	Explanation	Number of applications
2.1	R&D in partnership between universities, RDI institutes and enterprises in view of obtaining results applicable to the economy	3
2.2	Investments in research, development and innovation infrastructure and development of administrative capacity	21
2.3	Enterprises' access to research, development and innovation activities	12

Table A3 3 Applications to NASR-funded projects by NACE Rev.2 2-digit sectors

NACE code	Sector description (principal activity of the applicant)	Number of applications
10	Manufacture of food products	1
13	Manufacture of textiles	1
22	Manufacture of rubber and plastic products	1
24	Manufacture of basic metals	2
25	Manufacture of fabricated metal products, except machinery and equipment	2
28	Manufacture of machinery and equipment n.e.c.	2
30	Manufacture of other transport equipment	1
32	Other manufacturing	1
33	Repair and installation of machinery and equipment	1
41	Construction of buildings	3
46	Wholesale trade, except of motor vehicles and motorcycles	1
62	Computer programming, consultancy and related activities	2
71	Architectural and engineering activities; technical testing and analysis	3
72	Scientific research and development	3
80	Security and investigation activities	3
85	Education	7
86	Human health activities	2

[48] Source: NASR Regional Office

Annex 4: Sources of Funding National RDIs located in the West Region

Table A4 1 - Sources of Funding National RDIs located in the West Region

	47 National RDIs			4 West Region National RDIs		
	2008	**2009**	**2010**	**2008**	**2009**	**2010**
1- TOTAL R&D Income (A+B+C+D+E+F)	83%	84%	82%	84%	79%	83%
A- From state budget (total)	75%	66%	61%	62%	43%	48%
Including:						
Program nucleus	17%	29%	27%	17%	21%	22%
NPII and CEEX (including co-financing for FP6 FP7, etc.)	45%	27%	23%	44%	21%	22%
B-Structural Funds	0%	2%	8%	0%	0%	0%
C- FP6 FP7 (not including state budget financing)	1%	4%	3%	0%	1%	1%
D- Other public international sources (not including state budget financing)	1%	2%	2%	0%	0%	0%
E- Contract R&D with foreign private persons	0%	1%	1%	0%	0%	0%
F- Contract R&D with Romanian private persons	5%	8%	7%	22%	34%	33%
2- Business income TOTAL	17%	16%	18%	16%	21%	17%
Including:						
Other non R&D sources of income (selling non-proprietary products and services)	16%	14%	16%	12%	12%	11%

National RDIs in the West Region: INCD ECOIND, ISIM, INCEMC

Annex 5- Universities located in the West Region

Table A5 1 - Universities located in the West Region

University	Established	Location	Private/Public	CNCSIS Accreditation
Aurel Vlaicu University of Arad	1990	Arad	public	provisionally authorized
Universitatea de Vest Vasile Goldis Arad	2002	Arad	private	accredited
Victor Babeş University of Medicine and Pharmacy, Timişoara	1945	Timisoara	public	accredited
West University of Timişoara	1944	Timisoara	public	accredited
Banat University of Agricultural Sciences and Veterinary Medicine	1995	Timisoara	public	accredited
Polytechnic University of Timişoara	1920	Timisoara	public	accredited
Universitatea Petrosani	1948	Petrosani	public	provisionally authorized
Facultatea de Inginerie Hunedoara, Universitatea Politehnica Timisoara			public	
Universitatea Ecologica "Traian" din Deva	1990	Deva	private	provisionally authorized
Universitatea "Eftimie Murgu" Resita	1971	Resita	public	accredited
Mihai Eminescu University Timisoara	1993	Timisoara	private	accredited
Tibiscus University of Timisoara	2002	Timisoara	private	accredited
Millenium University of Timisoara		Timisoara	private	provisionally authorized
Ioan Slavici University Timisoara	2000	Timisoara	private	information not available
Dragan European University of Lugoj	1996	Lugoj	private	Information not available

Source: Consiliul National al Cercetarii Stiintifice din Invatamantul superior (CNCSIS), 2012

Annex 6 -Firm Interviews

The main objective of this report is to provide a critical overview of the strengths and weaknesses of the sector's productive system, detailing demand and supply characteristics, as well as an overview of the institutional framework and policy environment for innovation in the sector. The technology absorptive capacity of firms (skills composition, sector-specific regulatory restrictions, access to finance, etc.) were examined in view of the specific determinants of technological upgrading in each sector. An assessment of the innovation status of each sector was provided whenever possible.

In order to evaluate each sector, interviews with firms in the selected industries (in addition to focus groups that were conducted in December 2012) provide a richer understanding of sector-specific contexts and more targeted policy recommendations. The main objective of the interviews was to understand the relationships between the investment climate variables (labor issues, infrastructure, capital markets/access to finance, competition environment, and innovation environment) and firms' capacity to absorb knowledge export and compete.

For the case studies to convey an accurate representation of the sectorial dynamics and a good assessment of the innovation environment, an effort was made to identify, for each sector, a diverse group of firms in terms of size, R&D expenditures, export propensity and ownership. Overall, 31 interviews were conducted. Table A6 1 presents the sectoral breakdown of this total. For confidentiality reasons the names of the firms are not included in the report.

Table A6 1- Interviews by sector

Sector /cluster	Number of interviews
Agri-food	8
Textiles / apparel	4
Auto	7
ICT	6
Construction*	5

Note: * interviews in the construction sector covered 4 firms and ROSENC

The minutes of these interviews covers, whenever possible, a set of topics as listed below:

- Machinery and equipment
- Technology: Research / Innovation /Product upgrades/ Sources of technology
- Labor: Skills + Training
- Infrastructure
- Quality and certification
- Institutions: Regulatory environment / Relationship with authorities / Judicial system
- Financing / Use of EU Funds
- Collaboration/relationships with suppliers, other firms, and universities/local institutes
- Other (Use of professional services, sector specific questions, etc)

AUTO SECTOR

The region has developed a valuable know-how in auto sector based on the long history of engagements with important multi-national auto manufacturing companies. The large share of FDI in the sector also reflects the apparent comparative advantages in the region. However the economic developments of the neighboring countries are likely to put pressure on the existing advantages of the West region of Romania. Attaining low labor costs is not a sustainable development strategy for the auto sector to remain globally competitive. Improvements must be made and policies must be developed to move up on the value chain and create higher value-added activities.

The results of the interviews show several areas, improvement of which is necessary to strengthen the existing comparative advantage of the region in this sector. These issues are listed below.

Increasing human capital to work on design and development activities in the region is a major constraint. Timisoara is the only region where such capacity is available, yet to a limited degree. Qualifications of the university graduates in areas of applying theoretical knowledge must be improved in order to be prepared for the labor market. Firms usually have difficulties finding the graduates to fulfill their needs and the skills obtained from the school are not sufficient for the demand of the sector. Interestingly, the concerns on skills are more likely to be expressed as a severe constraint for large, globally integrated MNC subsidiaries than small or medium size auto part suppliers who produce low value added products along the supply chain.

One way to alleviate this mismatch is improving the linkages between the industry and universities. This can happen through collaborations on joint projects, adjusting the curriculum to respond to the industry needs which would help development of the appropriate skill sets for young graduates. A better guided skilled labor force complemented with technological ambition would strengthen the region's comparative advantages in this sector.

In addition to improving tertiary education, vocational training schools also need to be established to supply qualified technicians (specialized labor) for the sector. Lack of skilled workers who can operate mid & high-tech machines add additional burdens on firms and increase cost of production.

- **Machinery and equipment**

In auto sector, machines and equipment are usually supplied from foreign suppliers due to lower quality levels in local products. To assure a certain level of quality in products and designs, well-equipped independent laboratory infrastructure is necessary in the region that can be easily accessed by local firms. Quite often lack of sufficient lab infrastructure inhibits or creates huge delays in testing quality and validity of new products, processes, and designs which are crucial in auto sector. Only few large firms like Continental have access to testing labs available in the West region which are not accessible to everybody. Some of these firms send their products to Germany or Hungary to be tested, but this is not very efficient.

- **Sources of Technology**

The required lab equipment for testing new products/designs in the sector is expensive and definitely beyond the reach of an individual local SME. Development of such labs can facilitate local SME's to be included in the global value chains and provide supplies for first and second tier suppliers. Labs with international standards in the region can attract the attention of OEMs and first-tier suppliers. It will also help accumulation of the know-how in the region.

- **Markets and Integration in Global Networks**

There are few other areas, improvements of which will help SMEs in the sector to become more integrated with the global networks.

One of these areas is unsatisfactory quality level of products which reduces confidence in working with local SMEs. This issue can be alleviated by more regress lab testing as discussed above.

Another area that would be helpful for the future development of the sector is providing consultation, training to improve skills, and mentorship to local SMEs on how they can be included in the global value chains. Attaining certain quality standards/certificates, better efficiency, timely response to client demands, utilization of new technologies and know-how for production, understanding and fulfillment of the necessary paperwork to supply for MNCs or for exporting would be helpful for connecting to global value chains.

Another constraint of SMEs is the lack of capacity to produce large scales of output. First/second tier auto suppliers would not prefer to work with too many small suppliers due to coordination problems this might generate. Yet small firms cannot respond to large demands. Well-functioning and well-connected auto clusters could significantly improve the output capacity of sector in the region especially by allowing SMEs to cooperate in production processes and enable them to jointly handle large scales of order.

- **Collaboration with suppliers**

A final area is increasing the awareness of major, foreign auto suppliers about the accessibility of local suppliers of intermediate products. Many foreign auto producers in the region are inclined to use local suppliers due to lower cost but are not fully aware of the capacity of local producers and are concerned about the quality of services local firms could provide. Once the issues raised above are addressed, establishing better networks between local suppliers and OEM or 1st/2nd tier suppliers would allow them to be included in the value chains. Few auto manufacturers mentioned that the quality of intermediate goods produced locally are not too different and even better in certain areas from foreign intermediate goods that are imported. These capacities should be better advertised and advocated in the region (probably through respective associations).

- **Research and Innovation**

There have been quite favorable developments in the region on auto sector. After years of engagements in low value-added, high labor-intensive tasks, some large MNCs have noticed the capacity built and the potential to use the local know-how accumulated over the years in the region to participate in design and development activities. This creates great opportunities for creation of knowledge spillovers to region. Timisoara and to some degree Arad has developed the know-how and capacity to be successful in these areas. These efforts must be scaled up. Because, still, for the majority of the sector, comparative advantage is generated by low costs. Moving the labor-intensive production facilities from hubs like Timisoara and Arad to regions with lower labor costs can contribute to the developments of these relatively more rural areas of the region while converting Timisoara and Arad to strong knowledge hubs.

- **Access to Finance**

Many local SMEs are extremely cautious in scaling up their production or diversifying their product scope. This mainly depends on the uncertainties in auto market and high interest rates charged by local banks to purchase a new machine/adopt a new technology both of which diminish the aptitude for risk taking. This leads to a bi-modal distribution of firms in the sector where large firms get larger and small ones cannot grow.

Some of the SMEs in the region have used EU funds for their productive investments. Accession to EU funds has been very helpful in alleviating the risks for new productive investments. However application process needs to be streamlined. Most of the time, the firm needs to hire a consulting firm and the evaluation process last long. Another area where EU funds could be helpful is meeting the quality standards requested by large auto manufacturers.

- **Infrastructure**

Two main aspects of investment climate stand out as major obstacles for the sector. Unstable flow of electricity and the unexpected outages affect businesses' operations and damage equipments. Considering the high usage of high-tech machines in the sector, this is a serious concern and a major source of productivity loss.

The second aspect of investment climate that constrains firms is the road infrastructure. The main way of transportation in and out of the region is through roads and there are not sufficient high-ways in the region. With better roads, firms can move their labor-intensive production activities to regions with lower density and keep their knowledge intensive activities like design and development in centers like Timisoara and Arad.

TEXTILE SECTOR

- **Machinery and equipment**

Companies operating in the "Textiles/ Apparel" sector in the region usually purchase all the necessary machinery and equipment from foreign producers (located in Japan, Germany, Italy etc.). These are used for intermediate production phases and sometimes for the entire production process.

Decision upon the technical and financial features of the capital goods required, or regarding the selection of the suppliers is particularly influenced by: i) the products range the company is specialized in which – in turn –is mainly determined by the requests of the client companies, ii) the financial stance of the textile company (including the ability to attract external financing sources from banks, affiliate companies, available EU funds etc.). Information regarding available state of the art machinery and equipment is gained through interaction with large MNCs clients and/ or equipment producers, with fellow/ competing textile producers in local business associations or through own market research.

Due to unpredictable economic conditions and to the increase of the adversity towards risks, some textile companies rather prefer to decline orders for which they do not have the necessary equipment than contemplate the opportunity of investing in machinery and equipment for innovative but risky products. Sometimes the quality of the existing labour force cannot accommodate the operating needs for modern, high tech equipment. Other companies prefer not to decline orders, which may lead to losing clients, and subcontract part of the production to other local firms. This is seen as a temporary solution, until the company will be able to buy new technologies and/ or to increase its capacity accordingly.

According to their production needs or features of their products, textile companies may involve in the adjustment of the machines they buy or intend to buy from machinery and equipment suppliers.

Sometimes, the first hand machinery and equipment purchase agreements include training benefit provisions to be offered by the supplier. However, most of the time such training programs are offered in an intensive manner only to technical staff of the textile company.

For distribution purposes, if the structure or the size of the deliveries allow for it, SMEs operating in the textile sector sometimes prefer to invest in and operate their own transport vehicles in order to reduce production and distribution costs.

- **Technology: Research / Innovation /Product upgrades/ Sources of technology**

Most of the textile companies in the region operate under "lohn" conditions: they own the production facility and hire their own the labour force while the client companies (most of the times large MNCs in the apparel sector) undertake all product research, design and development phases of the production stages. Designs and material inputs are either provided or the suppliers of such materials are imposed to the textile companies by their clients. The clients only hire production capacity from the local textile companies. In such conditions, except for rare cases, RDI activities are quasi inexistent in the textile companies. However, some textile companies have understood the strategic risk that affects their business and started to engage in vertically integrated activities and to offer complete products instead of parts for further assembly process phases. Such integration allows for design and development skills to evolve. Gradually, the production will move-up the value chain towards ever more specialised products and those that have already seized the opportunity are performing well even in the current unpredictable economic conditions.

Understanding the importance of effective and efficient communication in business, one company has been trying to introduce the use of video conferences with foreign clients, in order to facilitate exchange of information regarding alterations/modifications needed when developing a sample. However, written correspondence (ICT facilitated) is still the rule in the business.

Software programmes related to production organization or ancillary activities are in place in most of the textile companies.

- **Labour: Skills and Training**

All the interviewed companies have identified both the insufficient number and the poor quality of the labour force as the main obstacle in front of business development. Textile companies lack sufficient employees, both high skilled technicians and engineers and low-skilled blue collars. The current production structure, the existing machinery and equipment, the lack of significant activities in product design and development does not require many engineers in the textiles sector. Development prospects are affected, nevertheless.

A regional characteristic is that the large automotive international manufacturers located in the region were able to pay higher than average salaries, generating high employees' turnover rates for other sectors with lower levels of labour productivity.

Some of the employers mentioned the lack of confidence in the quality of the education system. Tertiary education graduates lack minimal practical competencies while the size of low-skilled labour force has been continuously shrinking due to closing down of the vocational schools or to their transformation into theoretical high-schools. The decline of manufacturing activities during last two decades may have been the reason for education system reform decisions but their effects negatively affect present day producers. The lack of vocational schools is combined with little interest from young people to work in factories as low-skilled workers at the sewing machines. Some employers expressed their concern regarding the aging of the labour force (blue collar workers) and the prospect of not having enough workers in a few years' time.

The companies have to offer training to their new employees but most of the time this only aims at achieving equipment and machinery operating skills. Although training services are available in the market (usually financed by EU funds) the lack of quality and adequacy to the needs of the employers determine them to engage in developing training programmes. Apprenticeship activities for newly hired employees are frequently undertaken inside textile companies. Provided legal framework becomes more flexible, many of the textiles companies would be willing to offer internships to students.

- **Infrastructure**

Although all the interviewed companies in the textile sector mentioned the poor quality of the road infrastructure, the location of the production facilities in the vicinity of the western border was perceived as a compensating advantage. From the Hungarian border westwards road infrastructure meets their needs. However, local road infrastructure and the lack of public transport services negatively impacts the production cost as employers are forced to hire private transport services for their employees. Form the employers point of view, the advantage of hiring cheaper labour force from the rural areas is partly offset by the need offer free transport services to those employees.

It should be mentioned that some of the textile companies perceived the poor development of road infrastructure towards the rest of the country as a competitive advantage against other regions that cannot benefit from FDIs that are "naturally forced to seize their migration towards cheaper east".

The liberalization of the energy market is seen as a threat to the mere existence of some textiles companies. The prices for electricity have been constantly increasing since 2007, which translated in higher costs for the companies. But, from 2014, when the energy market in Romanian will be completely liberalized, the energy prices are expected to be so high that some companies will have to close their business, as they will not have the competitive advantage of lower production costs.

- **Quality and certification**

Due to the specificity of the production process in the local sector of textiles, quality standards are imposed by the major apparel producer clients and local textile/ apparel "lohn" producers have to strictly observe quality standards and obtain adequate certification whenever the client requires it.

Some of the textile companies organize in house quality check of fabrics, quality assurance and quality control for production. Others outsource such services.

- **Institutions: Regulatory environment / Relationship with authorities / Judicial system**

Although seen as offering flexible conditions for the labour market, the current Labour Act is perceived as constraining in respects such as maximum period of working time/ week, minimum period of free time/ week, etc.

While not complaining about the legal framework per se, most of the managers complained about the administrative burden generated by the unpredictable interpretation of legal provisions and arbitrary actions of the public. Too many random inspections have negative impact upon the companies' activities.

Permits and authorizations administrative procedures are considered time consuming expensive.

Textile companies lack negotiating power against large multinational clients and tend to strictly observe contractual provisions. On the other hand if their foreign clients breach ongoing contracts local textile producers lack the capacity to seek contract enforcement abroad (where the governing law courts in their case are usually located).

While most of the textile companies consider that business associations could help their business some of the companies consider existing associations ineffective and "too involved in politics".

- **Financing / Use of EU Funds**

The financing solutions the textile companies call on are as various as the companies themselves. Some of them, more risk adverse, prefer to use only internal sources (profits and shareholders' loans) to cover for investment needs. For daily operations companies have access to credit lines. Other companies use a mix of own financial sources (reinvested profits and shareholders' loans) for both investment and operational needs. However the level of the interest rates is perceived as high.

Companies are aware of the availability of the EU funds but generally lack clear information regarding application and eligibility. Some of the companies have already accessed or tried to access EU funds but they do not consider this type of financing as affordable because it requires their significant financial contribution towards sustaining the cash-flow of the project. The companies complained that project budgets are restrictive and do not always cover for their particular needs (i.e. training). Another problem with projects from EU funds is the very long evaluation period of the application. Companies that applied for funds for investments in new technology can wait more than one year until they found out if the application is approved or not. Regarding the providers of human resources related services

that accessed the dedicate EU funds the companies complained that they offered only non-relevant and/or low quality training programmes.

- **Collaboration/relationships with suppliers, other firms, and universities/local institutes**

As mentioned before, local textile companies are highly dependent upon large multinational clients that either provide themselves or impose or suggest material, or intermediate production. Such providers, as well as machinery and equipment suppliers are usually located abroad. Local business associations are not considered effective by the interviewed companies. Both local and at the national level there are good quality universities and research institutes for the textile sector but cooperation with business sector needs improvement.

- **Other (Use of professional services, sector specific questions, etc.)**

Business service providers are available locally and the textile companies partly outsource ancillary activities.

Textile companies feel Romania missed a good opportunity in 2009 when unrest in North Africa and rising costs in Asia prompted some apparel companies to relocate production back to Europe. The government could have offered incentives to attract significant textiles and apparel business to Romania at that time.

Non SMEs local companies feel neglected by the government that mostly directs support to large FDIs and local SMEs.

ICT SECTOR

- **Labor Availability, Skills and Training**

Availability of qualified labor is the most pressing issue faced by ICT firms in the region. All firms interviewed agreed on this point. The problem is not the number of total graduates but the number of good graduates of enough quality that could work proficiently as software developers. In Timisoara, labor availability is becoming a big issue because all the firms in the sector (and some auto MNCs) fight for the same pool of software development workers and graduates. In Arad and Hunedoara, the pressure is less intense because there are fewer ICT firms and the ones interviewed are the biggest players in those markets (facing no real competition in the city).

In order to remediate the lack of knowledge and skills of recent graduates from universities, all firms provide extensive training. This training could be extensive and take up from 6 months to more than a year in some cases. Most firms consider that some training is always necessary in the industry as universities provide basic knowledge and most programing skills are developed on the job. However, the two firms from Timisoara consider that the quality of the average graduate from local universities in ICT fields have decreased over time – although they still consider that between five to ten percent of graduates are very good. Additionally, because of the heavy MNC presence in Timisoara, local firms lose software engineers to firms in Austria, Germany and the UK, which increases the pressure to recruit qualified labor.

- **Infrastructure**

Infrastructure is not perceived as a problem for any of the firms interviewed. No problems were reported with electricity or internet connectivity and speed – the latter was highlighted as one of the comparative advantages of the region. The firm located in Hunedoara complained that it is not easy to reach their clients in the West Region (mainly in the Timisoara and Arad areas) and that a highway might help, but this is also a function of the firm's location.

- **Quality and certification**

Quality and certification only seemed important for the firm that was involved in providing networks implementation and maintenance in order to certify that they are preferred IBM server hardware and software suppliers. Other firms have international certifications, even though these are not required, to show that they comply with international standards.

- **Institutions: Regulatory environment / Relationship with authorities / Judicial system**

The constant change in regulations (especially VAT and other taxes) seems to affect medium/small firms more. In terms of software development, patenting and intellectual property issues are not important for any of the firms interviewed because the resulting software is property of the headquarters/mother company and they deal with these issues.

- **Finance**

Most of the financing at the two big firms interviewed is done with internal funds - either from the subsidiary/local company or with funds from headquarters. One of the medium size firms uses its own revenues while the other uses bank credit and EU funds to finance mainly purchases of equipment (servers, computers, etc). The only firm that relies on banks for financing states that paperwork is time-consuming and interest rates are high but that the situation has improved compared with a decade ago. No problems in terms of collateral were reported.

The mid-size firm that used EU funds complained that reimbursements for the investments pre-financed by the firms take a lot of time and even extend past the dates specified in the contract.

- **Collaboration/relationships with suppliers, other firms, and universities/local institutes**

All the firms interviewed develop software exclusively for their headquarters/mother companies (Alcatel-Lucent and OCE) or for a sole foreign firm that outsources this task to them (CVS and Memory). They do not have any clients in the West Region or in Romania and do not seem interested in exploring working with firms in the region (mainly because the work for their only client is already consuming all their time and resources).

Collaboration with universities in terms of developing new courses, provide training and internships is considered good in Timisoara. Firms in Arad and Hunedoara have also contacted universities but their engagement is small in magnitude maybe because they lack the size or critical mass of firms in the region to properly engage the local university and benefit from it.

Linkages with other firms in the ICT software sector are limited in Arad and Hunedoara because the interviewed firms are the biggest players and there are very few firms in their localities doing the same type of job. In the big companies, outsourcing of software development to other firms is usually not possible because of headquarters' directives. However, both firms in Timisoara highlighted that there are firms that could do this job in the area. Conversely, in Arad or Hunedoara this possibility does not exists (or is remote) because there are not many specialized firms with good quality.

AGRO-FOOD SECTOR

- **Machinery and equipment**

Companies operating in the sector in the region purchase all the necessary machinery and equipment from foreign producers (especially from DE, IT, US) through local branches. The machinery is relatively new and major investments were made in the period before the crisis to support enhanced productivity, new products and to respect the EU standards of quality needed after the 2007 accession. 2 out of 6 companies update equipment regularly and buy mostly off the shelf technology, the others consider that they are up to date and made adaptations for new products or technological processes. EU equipment standards ("like in other EU developed countries") are regarded as a required baseline for good product quality and productivity. The equipment was initially mainly financed through EU funds (but it may not be the characteristic of the sector), Bank lending or equity, while the continuous renewal and adaptation is mainly financed through own capital. The sums invested in machinery average between EUR 500.000 to 2.000.000 for companies that used EU funds. The companies interviewed feel confident that with the current machinery they could compete in quality on the external markets. Maintenance is mostly performed in-house with specialized training provided by the equipment providers.

- **Technology: Research / Innovation /Product upgrades/ Sources of technology**

R&D is a marginal preoccupation within the sector, and is mostly present in the activities animal of cross-breeding and feeding (in order to increase the raw material production). One firm is actively searching collaboration on new bread recipes with an Institute outside of the region for new product development. Another company is actively involved in seed testing as their main focus is on higher cereal yields. The companies are willing to collaborate with Universities but do not trust in the capacity of these for applied research, as previous attempts were timid and unsuccessful. The perception of the firms is that they innovate through developing new lines of production and new technological processes. Four out of six companies have a strong emphasis on product upgrade and diversification while the rest find difficulties in experimenting due to current buying power or because the focus is on traditional products. Companies that have most of their value chain and produce for the national market stand out as innovators in terms of technological upgrades and testing for raw material production. This is based on motivation to develop further market share and because own financing is not an issue for them.

- **Labour: Skills and Training**

All the interviewed companies have identified both the insufficient number and the poor quality of the highly skilled labour force as the main obstacle in front of business development. Highly skilled technicians are mostly needed. The sector requires technical staff that could enter rapidly in production and be flexible, mobile as most of the businesses are in rural areas that are not particularly attractive. Salaries act as a motivational factor mostly in Timis Area and Arad (where near the city), while for the remote areas (Curtici, Bocsa, Resita) the scarcity comes mostly from low quality curricula of regional faculties and lack of fundamental knowledge and skills that could not be replaced by in-house training. Timisoara agronomy engineers are perceived as of good quality.

Lack of professional schools are a gap in production expansion, as skilled workers are difficult to find and most of them need training for at least 6 months to be productive. This category is rapidly ageing and skills needed in the sector are being lost within the new generation. Training is seen as necessary, always in-house and on the job, to compensate the lack of such schools. The highest lack of productivity is found at this level and is mainly linked to practical abilities that used to be acquired in

such vocational schools. The company is planning to set up a vocational school in the area for carving and meat preparation –using European Funds; for this they would like to bring foreign professors and select the best students (meat carving).

While the unskilled workers selection is not an issue in general (as the firms are remote – thus lack of choice towards urban life and no other industries are preponderant). Their retention is difficult and seasonal turnover is a given, as most of them are leaving abroad for seasonal work. The RO companies cannot compete in wages with foreign located companies.

On the seasonality of some agricultural activities, the firms would want more flexibility of the workforce, as they would have a peak and then business gets back to normal. Legislation and people's mentality that consider a job as a lifetime right (not depending on the production level) is a problem for that.

- **Infrastructure**

All interviewed companies in the sector mentioned the poor quality of the road infrastructure, lack of highways. The location of the production facilities in the vicinity of the western border was perceived is important for the exporters, but the specifics of the firms that we interviewed is that they are local/national distributors facing difficulties for delivering within the national big retailers networks. Exporters are not impeded. For local distribution networks (Resita-Timisoara-Arad-Oradea-Satu Mare), roads used to be a problem that has currently drastically improved.

Energy fluctuation is a problem as the national network grid encounters disruptions and blackouts. This is a major risk for the food processing industry and the firms have invested in mitigating suck risk through own equipment.

For the water intensive production, the water utilities are problematic (especially Laurul and Pangram) in the country side and mountain areas.

Irrigation is a national wide issue that affects the large scale crop farming and is perceived as a major bottleneck in the years to come in the light of higher yields necessity and climate change effects.

- **Quality and certification**

Quality standards are imposed by the major retailers and for EU exports. All interviewed firms have updated certification requested by EU regulations for internal market and exports. In the case of suppliers, the food processing activity also requires certification of raw materials and it seems that apart for the companies with integrated value chain, there is mistrust on smaller local suppliers in terms of quality certification, especially in the meat production where the black market is a serious issue. State controls on the quality are too numerous and from different local agencies. There were no particular complaints about the access to state testing labs, apart from the milk testing which is done outside the region and takes too much time. Also, lack of complaints could result from the fact that some of these companies have invested in their own labs. The labs are used only in their interest and do not feel a potential commercialization of such services.

- **Institutions: Regulatory environment / Relationship with authorities / Judicial system**

While not complaining about the legal framework per se, most of the managers complained about the administrative burden generated by the unpredictable interpretation of legal provisions and arbitrary actions of the public. Too many random inspections have negative impact upon the companies' activities.

The specificity of the agro-food is the alimentary security which at the lowest suspicion of flaw has a strong echo in consumers' decision and firm reputation. Moreover, state controls peak arbitrarily as soon as a media make such allegations. There is no business association at local level or national level, or even the Government that could protect local firms for such unfair allegations. There was a series of scandals that unfairly and indirectly touched upon Romanian producers (pork, milk, eggs) and the communication was a big problem, therefore product demand dropped dangerously.

- **Financing / Use of EU Funds**

The financing solutions are as various as the companies and specific agro food sectors. Most companies use a mix of own financial sources (reinvested profits), Bank credit lines and EU funds. The interest rate is generally perceived as high. Most companies developed at the beginning through FDI or Bank loans. As they grew and wanted to expand, EU funds mostly through SAPARD funds were accessed. They generally used it for new production lines, plants, machinery, testing labs. EU funded programmes exist but the collaterals required sometimes make them inaccessible for small producers. Moreover, EU funds rules are very bureaucratic, more restrictive than EU regulation in general and require a more flexible implementation by EU funds administration staff. The big companies interviewed all benefited from EU funds.

- **Collaboration/relationships with suppliers, other firms, and universities/local institutes**

FMCG retailer chains dominate the distribution market and pose very restrictive margins on the local producers. The companies with integrated value chains and high production have enough negotiation power in contracts with retailers. The value chain integrators have developed small shops chain that secure the main market share they have. An innovation is brought from a firm which has a plan to develop egg and liquid egg automatic machines in urban areas. A peculiar aspect is that it seems there is a lack of offer and demand communication in the region (one firms produces EU quality certified meat while two others imports such meat because they thought no Romanian producers are EU export standard certified; and a fourth firm uses for the pastry imported liquid eggs as they were not aware than only 40 km away a local company is the first liquid egg producer in Romania).

Associations should play a higher role in representing local interests. In this regard, promoting Romanian products through branding and marketing campaigns, as well as communication on food safety and local producers' observance of the rules could be useful strategies.

There is a lack of raw materials, and it proves difficult to collect it form small local suppliers. When such shortage exist (in all cases except the value chain integrators), the firms import from near EU states (AU, DE, FR, IT).

Universities and institutes are perceived as not bringing value added to most of the company's efforts of innovating. Timid collaboration with universities is being made for R&D (cross breeding and new recipes) and in finding graduates as workforce through internships.

- **Other (Use of professional services, sector specific problems.)**

Business service providers are available locally and provide satisfactory quality. Whenever the case they outsource legal services to professionals. EU funds consulting companies could be much improved in order to implement successful EU funded projects. Labeling and marketing companies are not well developed for those companies searching for national or international product expansion and diversification. Some firms have such services in house, others use Bucharest based services or international expertise mainly recommended by international shareholders.

Non SMEs local companies feel neglected by the government that mostly directs support to large FDIs and local SMEs. EU subsidies allocated to Romania are insufficient as compared with EU neighboring countries affecting cross border market competition for raw materials.

Association: Market-orientation and funding eligibility of most agricultural holdings are restricted: The Romanian agricultural sector does not fully utilize its widely recognized agro-climatic potential, as it continues to be dominated in number by miniaturized (semi-) subsistence holdings with limited market orientation and eligibility for CAP funding.(Kray – CESAR project)[49] Thus association of small scale farmers could greatly improve access to finance, production sustainability for food processors, lower food processing costs and a more robust employment in rural areas.

Land consolidation, as well as the development of the land market is required. The still uncompleted land and property reform and development of the land market continues to limit access to credit and other rural financing options, and has delayed the restructuring of farms in accordance with market demand and the need to enhance competitiveness.[50]

Black market (especially flour –bread and pork meat) is an issue for local interviewed companies that need to cope with competitors that use non-registered, not quality certified raw materials from Romania or neighboring countries.

[49] http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2007/11/07/000020953_20071107100638/Rendered/PDF/40998010RO.pdf
[50] ibidem

CONSTRUCTION

- **Machinery and equipment**

The majority of machinery and equipment used by construction companies in the West Region is imported, primarily from Germany, Spain, Italy, or Czech Republic (the necessary technology is not available in Romania). Most of the materials used are also imported (even though they may be purchased from companies based in Romania). The acquisition of these supplies is mainly financed by bank credit. Companies are interested in European Funds that could be used to introduce new technology but one problem is that the lengthy procedures associated with this type of financing do not always match the fast business needs of the private sector and sometimes, if the process takes as long as two years, the target technology can become outdated.

- **Technology: Research / Innovation /Product upgrades/ Sources of technology**

The majority of construction companies in the region adapt the existing off-the-shelf technology to the specific needs of the project of client but do not have an organized R&D division. Research is expensive and the availability of capital for this type of activities constitutes a major obstacle. However, some companies manage to run small research initiatives. These companies are mainly located in the Timisoara area, where they have access to higher levels of know-how than in other counties in the region, and can collaborate with students and teaching staff at the Politehnica University. Some companies have managed to introduce certain innovative production techniques or are working on a product prototype. These small projects usually started from the company's attempt to better meet the needs of its clients or by observing trends at international fairs.

- **Labor: Skills + Training**

Highly-Qualified Labor. Companies (especially in Timisoara) can usually find qualified labor force, although they complain that many graduates, in fields such as engineering, do not have sufficient practical (and sometimes theoretical) skills. Proximity to Politehnica University is essential for companies as this way they can recruit interns, collaborate on research and product development or provide technical training for staff. Small or medium-sized firms face wage competition from multinational companies and can sometimes invest in training for highly-skilled employees who choose to leave soon after they acquire better qualifications. The economic crisis had alleviated some of the pressure on labor availability.

Skilled and Unskilled Labor. The lack of vocational schools has had a significant negative impact on the availability of skilled labor (masons, electricians, etc). The courses offered by unemployment agencies fail to provide blue collar and unskilled workers with the necessary abilities. Companies train the workers in-house or contract specialized training if they have the financial means or the opportunity to do so (ex: worker training programs sponsored by German funding). Worker turnover is also a problem for unskilled labor (people used to leave to Western Europe) but the trend has been reversed with the onset of the economic crisis.

- **Infrastructure**

The general perception is that the local roads and the quality of the infrastructure have degraded due to lack of investments. Companies have usually managed to adapt to the situation but they are affected by the state of the road infrastructure to various degrees. Firms that use their own

trucks for transport complain most stringently, as this leads to vehicle depreciation, delays and loss of competitiveness. Most pressing issues: the general poor quality of the roads in the region and the lack of a ring road for Timisoara.

- **Quality and certification**

In general companies meet all the necessary standards required by the clients or as a condition to participate in government procurement auctions.

- **Institutions: Regulatory environment / Relationship with authorities / Judicial system**

Changes in legislation occur often and are unpredictable. This concerns both horizontal regulation (tax code or labor code) as well as sector-specific legislation concerning the rules for renewable energy. For example, uncertainty related to the distribution of 'green certificates' can derail a company's business plan.

Litigation procedures take a very long time and negatively impact business. Contract enforcement can be improved, and outside judicial courts arbitrage procedures are considered a realistic solution.

- **Use of EU Funds**

EU Funds are very important for construction companies in the West Region via two main channels: i) large scale development projects in which these companies can participate via government contracts; and ii) Smaller projects for which the companies can apply which are focused on technology development and research (sometimes in collaboration with Politehnica University) and upgrade of own technology and equipment

However, some stakeholders mention that the procedures required to access European Funds are not transparent. Sometimes national/local authorities impose additional requirements which make the process slow and cumbersome. Long delays in project approval can render the particular technology (the end-use of the funds) obsolete. As a result, these delays can make the company waiting for funding lose competitiveness.

- **Sector Specific Issues**

The sector is highly dependent on the government either as supplier of contracts (particularly in times of economic downturn, when private investment decreases significantly) or as regulator and provider of subsidies for renewable energies.

In the case of state contracts, the lowest price criteria used in tenders often restricts the quality of materials used by construction companies. Also, if the state does not make payments on time, this affects the company's capacity to pay the banks (which can put small companies into bankruptcy)

The legislation regarding renewable energies changes often which can impact the ability of companies activating in this field to make business plans. Many state aid and other incentive schemes that are currently in place are mainly directed towards large FDIs.

- **Associations/ Cluster Activities**

ROSENC is a Romanian NGO organized as a cluster association of: firms and industry, research organizations and public institutions with the aim of promoting renewable energy sources, energy efficiency, new sustainable energy sources within the West Region and across Romania.

One of the most important functions that ROSENC fulfills is that it focuses on providing the necessary (but missing) incentives to foster collaboration. For instance, for a project to produce solar panels they created a new enterprise because firms were reluctant to collaborate or conduct joint research/invest resources with other firms fearing some could free ride. Their solution was to create a new company in which all involved parties were shareholders. This way all parties would have an incentive to bring the project to a commercialization phase. Also, university professors were made shareholders in order to increase the incentives for collaboration.

The leadership of the organization ROSENC approaches each project with a comprehensive look at the value chain in order to identify what links can be provided in the region, what is lacking, how the work can be organized among its members, and what parts of the supply chain need to be strengthened in order to improve the project's chances of success. For instance, for their project on poles of competitiveness, ROSENC mapped the whole value chain and found that the missing link was the power cells (which were not produced in the region) so it proposed a project to fund a factory that will make that missing component.

In the future, ROSENC could play a key role in the West Region for mobilizing existing know-how in the field of renewable energies and for promoting collaboration which can result in innovative and marketable solutions in the area of energy efficiency.

Annex 7 –Map of Tourism Cluster

Suppliers and related instruments

- Infrastructure & Real Estate development
- Energy supplies
- Domestic retailers (Handcraft, cafes, etc.)
- Hospitality Equipment suppliers
- Emarketing and management software

Core Components

- Travel Agencies and Tour operators
- Attraction & activities
- Transport
- Accommodation
- Restaurant

Supporting agencies

- Government agencies (National tourism authority, Ministries of Tourism or Culture)
- Regional & local public authorities
- Education/Research institutions (Hospitality training schools, etc.
- NGOs, professional associations, etc.
- Banking & financial sector

Related clusters

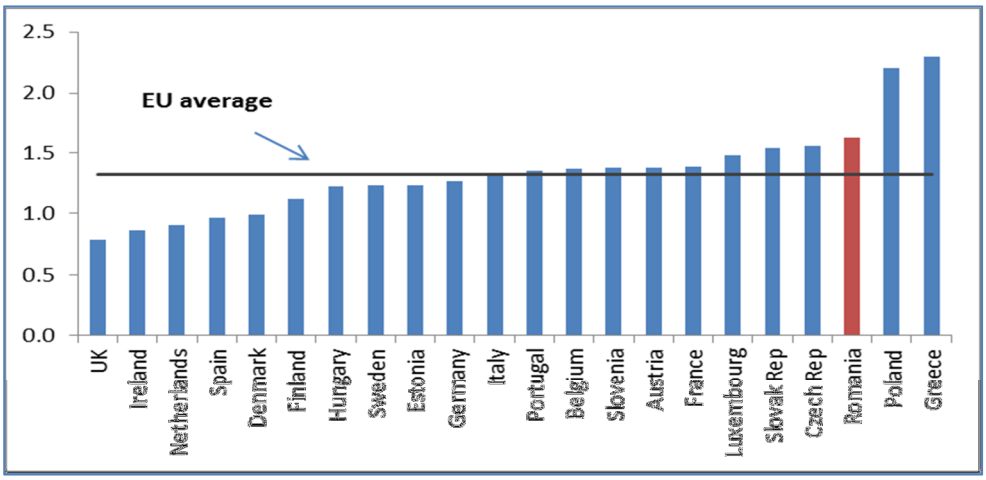
- Agriculture/food/ wine cluster
- Textil, design & fashion cluster
- Real Estate/ Construction cluster
- **ICT Cluster**
- Transport/logistic Cluster
- Health cluster
- Finance/ Banking cluster

Annex 8- Inquiry into the Legislative and Competitive Environment at the Sector Level

The competitiveness of a country or region depends to a significant extent on the local business environment in which firms have to operate. A regulatory framework that does not impose unnecessary burdens can facilitate integration in the Single Market and accelerate growth and convergence to higher income levels. This is because distortive business regulation can result in resources being directed toward compliance rather than toward the creation of productive output, and may constrain the choice of production techniques, leading to a misallocation of resources. In the EU context this is particularly relevant, as improvement in the regulatory environment and its alignment with EU standards is essential to reap the full benefits of the single market.

A regulatory environment conducive to competition can support GDP growth by providing incentives to reduce costs, innovate and increase efficiency. A recent study on product market regulation (PMR) in European countries – De Rosa et al (2011)[51] - suggests that Romania's regulatory environment is more restrictive than that of most EU comparators. This finding is substantiated by the fact that, out of the 22 European Union countries included in the study, Romania ranks 20th for the economy-wide product market regulation indicator, based on methodology developed by the OECD (see figure below).[52]

Figure A8 1-Product Market Regulation for EU countries, aggregate level



Source: De Rosa et al (2013).
Note: all the PMR indicators are scored on 0-6 scale, with higher values indicating more restrictive regulations.

[51] De Rosa, et al (2013). "Product Market Regulation in Romania: A Comparison with EU Countries." World Bank Policy Research Working Paper, forthcoming

[52] The PMR approach used relies on a methodology developed by the OECD (Conway et al., 2005 and Wölfl et al., 2009), that measures the degree to which domestic policies inhibit or promote competition. The data – which is derived from a self-reported survey – is policy-focused as opposed to perception based (or based on market outcomes). It is available for OECD members as well as Brazil, China, India, Indonesia, Russia and South Africa. The most recent set of data for Romania was collected in 2011. Data for all other countries reflects the results of the 2008 survey. All the PMR indicators are scored on 0-6 scale, with higher values indicating more restrictive regulations.

A more detailed examination of the PMR indicators indicates that at the national level the most important challenge to competitive markets is posed by significant degree of control the state still wields over the economy, particularly in the infrastructure sector. In addition, despite reform initiatives which have aimed to improve the business environment, a number of legal barriers to entrepreneurship still exist, in the form of administrative barriers to start-ups and barriers to services. *To the extent that laws and regulation, general or sector specific, are defined at national level, all the results highlighted above are, to a large extent, also valid for the West region.*

Against this background and in order to complement the analysis conducted as part of the current report, this annex aims to highlight a series of pertinent legislative aspects regarding the target economic activities in the West region. In addition, it outlines, based on official reports issued by the Romanian Competition Council (RCC), a number of recent developments related to competition in these sector-clusters in order to identify policies, laws and regulations that may unnecessarily impede competition. Using RCC materials, it examines potential State protection in the industry (e.g. tariffs, subsidies, barriers to entry) and the possible dominance of incumbent players that might affect the ability of new businesses to emerge.

The list of relevant laws included below covers EU legislation directly applicable to the sectors as well as primary national legislation (which are also valid for the West region). This selection points to a number of key legislative aspects but is not intended to serve as a comprehensive assessment of the entire legal framework for each particular economic activity.

Relevant regulation for the **agro-food** cluster in the case of *fruits and vegetables* encompasses national legislation covering, among other aspects, financial support measures and promotion of the consumption of fruits in schools, as well as EU legislation regarding the organization of a common agricultural market and standards for commercialization of products. In the case of *wine*, relevant national legislation includes aspects pertaining to financial support measures for the promotion of wines, financial support measures for the production of grapes, or restructuring measures for crops. It is also worth highlighting pertinent EU legislation in this area regarding: the common organization of the market in wine as regards support programs, trade with third countries, production potential and on controls in the wine sector; protected designations of origin and geographical indications, traditional terms, labeling and presentation of certain wine sector products; the categories of grapevine products, oenological practices and the applicable restrictions. For *cereals*, relevant national and EU legislation includes specific financial support measures. A number of national and EU regulations on *safety and inspections* are also highlighted below, as well as national legislation regarding *promotion*, *storage* and *packaging*. *Organic agriculture* is also subject to a set of legislative norms which encompass aspects such as financial support for improving quality, labeling, protection of bees, or agricultural cooperation. Laws focused on *competitiveness* in the agro-food sector include measures for the support of exports, and for increasing competitiveness, among other.

For the **textile** cluster relevant legislation highlighted in this annex refers to work safety and security, labeling, and financial support measures to increase the competitiveness of industrial products.

In the case of **energy efficiency and green energy**, national legislation encompasses, among other aspects, decisions regarding the regional aid scheme for the use of renewable energy sources, the heating program for the 2006-2015 period, and the full opening of the electricity and gas market.

Regulation pertaining to **ICT** includes aspects such as electronic communication, privacy laws, or the strategy for stimulating the development of the national network of business incubators. Specific **tourism** legislation emphasized in the current annex refers to tourism authorizations, tourism promotion, or tourism development, as detailed below.

Regarding recent developments on competition issues in the target economic sectors, the findings of the Romanian Competition Council included in the latest annual reports[53] issued by the RCC highlight some important issues for the agro food sector. Though the RCC assessment focuses the national level, the results are also valid from a regional perspective, and then for the West region. This is, first, because laws/regulations applied at regional level are virtually the same as those for the whole country, and, second, because regional market structure (and market conditionings), in a given sector, tends to mirror the national trend.

A recurrent sector that benefited from competition awareness in the last three years is the **agro-food** industry, particularly the commercialization of products and market services. In 2012, the competition authority has submitted an opinion on the proposal to amend the Government Ordinance no.99/2000, initiated by the European Affairs Commission of the Senate. The draft law essentially stipulated an obligation imposed to super/hypermarkets to sell at least 80% Romanian products and to relocate stores over 400 sqm outside the cities. The opinion of the RCC was not favorable, primarily based on the fact that this provision impacts the principle of free trade without frontiers within the international market as established by the Treaty on the Functioning of the European Union. Moreover, it deters the free movement of goods and services through effects on retail, consumer options and cities' capacity to develop. The remark related to the development of cities is mainly based on the market inquiry performed by RCC in 2011: "In the UK, studies have shown that development outside the cities has affected traditional shopping centers, consumers migrate to the suburbs to shop at mega-stores and city centers lost due to lack of consumer traffic. In Norway, in 1999, after the adoption of a national policy on the location of shopping centers outside the cities, it was found that urban centers were deprived of income from retail, other services were gradually moved outside the cities, and the population has gradually become dependent on personal car for shopping."[54] In terms of agro-food sector policies this opinion entails that the regional and national players must develop competitive advantages that rely primarily on new marketing innovations, innovative processes and price structure. This could allow the creation at regional and national level of a competitive edge that can develop without direct interference of the policy makers in the retails business, especially in the process of product acquisition, product origin, and location of new retail shops in the urban areas.

The RCC also opened a market inquiry in 2009 as a result of milk producers' dissatisfaction with the purchase prices charged by manufacturers and in order to assess the applicability of community competition rules to the Romanian agri-food sector after EU accession. The following market characteristics were analyzed: structure, level of competition, specific operating mechanisms, behavior of participants and to what extent the price received meets market expectations. The investigation revealed that the functioning of the producer - processor segment of the milk market in Romania is constrained by statutory rules, regulations which are to a large extent related to European Union policies in this area. The opinion of the RCC was that Romanian producers of milk are in a disadvantageous position in terms of bargaining power, given that delivery contracts are written individually and they do not hold shares in the processing companies. This finding was largely supported by the interviews with firms conducted in the West Region, which highlighted the the need of the milk processing companies to ensure as part of contractual arrangements that milk producers can guarantee timely delivery on a constant basis and that the product respects EU requirements in terms of storage, hygiene and the tracking of documentation for dairy products. As the high number of milk producers

[53] Romanian Competition Council Annual Reports of 2008, 2009, 2010, 2011, 2012. These findings refer to assessments conducted at national level. The Competition authority has the mandate by Law 21/1996 to provide its opinions on legal initiatives that may impact free competition on the Romanian markets.

[54] Competition developments in key sectors 2011, Romanian Competition Council

represent the norm in the national and regional context, without any form of inter producers association the bargaining power and price setting lays with the processors, which may prevent this type of producers from gaining a better price margin, has the potential to reduce thus activity to subsistence farming, reducing access to investments in production and constraining producers from moving up the dairy products value chain.

Apart from the economic activities highlighted above, the other sector-clusters which constitute the focus of the current report do not appear to raise specific competition issues at national or regional level.

List of relevant legislation[55]

HOTĂRÂRE nr. 45 din 21 decembrie 2012 pentru acordarea încrederii Guvernului (The Government Program)

I. Agro-food

I.1. Fruits and vegetables

A. National Legislation

- LEGE nr. 312 din 8 iulie 2003 *privind producerea şi valorificarea legumelor*) – Republicare*
- LEGE nr. 348 din 10 iulie 2003 a Pomiculturii*) – Republicare
- LEGE nr. 325 din 20 octombrie 2009 *pentru modificarea lit. b) a art. 29 din Legea pomiculturii* nr. 348/2003
- HOTĂRÂRE nr. 1530 din 12 decembrie 2007 *pentru aprobarea normelor metodologice de aplicare a Legii nr. 312/2003 privind producerea şi valorificarea legumelor*
- LEGE nr. 60 din 22 martie 2007 *pentru modificarea şi completarea Legii pomiculturii nr. 348/2003*
- HOTĂRÂRE nr. 1078 din 10 septembrie 2008 privind acordarea de sprijin financiar grupurilor de producători recunoscute preliminar şi organizaţiilor de producători în sectorul fructe şi legume
- ORDIN nr. 694 din 18 noiembrie 2008 privind condiţiile de recunoaştere a organizaţiilor de producători şi a grupurilor de producători recunoscute preliminar în sectorul fructe şi legume, precum şi modul de accesare a sprijinului financiar de către acestea cu modificările și completările ulterioare.
- ORDIN nr. 162 din 29 iunie 2011 privind instituirea unor măsuri excepţionale cu caracter temporar de sprijinire a sectorului fructelor şi legumelor.
- ORDIN nr. 91 din 11 februarie 2008 privind modalitatea de acordare a plăţilor tranzitorii pentru tomate destinate procesării şi aprobarea prim-procesatorilor
- HOTĂRÂRE nr. 154 din 13 martie 2012 privind aprobarea cuantumului sumelor alocate în sectorul vegetal, ca mecanism de susţinere a producătorilor agricoli prin aplicarea schemei de plăţi tranzitorii pentru tomatele destinate procesării
- ORDONANŢĂ DE URGENŢĂ nr. 24 din 24 martie 2010 privind implementarea programului de încurajare a consumului de fructe în şcoli, aprobată prin Legea nr. 195/2010

[55] EU Legislation directly applicable and primary national legislation. Secondary legislation was added in case of specific subsectors and specific economic incentives

- ORDIN nr. 85 din 8 aprilie 2010 privind aprobarea Specificaţiilor tehnice pentru procedurile de atribuire a contractelor de furnizare a fructelor în şcoli cu modificările și completările ulterioare
- HOTĂRÂRE nr. 889 din 7 septembrie 2011 privind stabilirea fructelor distribuite, a perioadei şi frecvenţei distribuţiei, a limitei valorii zilnice/elev şi a măsurilor adiacente distribuţiei de fructe, a bugetului aferent acestora, precum şi a modalităţii de implementare efectivă şi de gestionare la nivelul administraţiei publice, în cadrul programului de încurajare a consumului de fructe proaspete în şcoli în anul şcolar 2011-2012
- ORDIN nr. 390 din 17 iunie 2009 *pentru aprobarea Metodologiei de autorizare a operatorilor din cadrul sectorului de legume şi fructe proaspete, în vederea folosirii regimului de autocontrol şi de utilizare a logoului comunitar*

B. EU Legislation

- REGULAMENTUL (CE) NR. 361/2008 din 14 aprilie 2008 de modificare a Regulamentului (CE) nr. 1234/2007 de instituire a unei organizări comune a pieţelor agricole şi privind dispoziţii specifice referitoare la anumite produse agricole (Regulamentul unic OCP)
- REGULAMENTUL (CE) NR. 1221/2008 AL COMISIEI din 5 decembrie 2008 de modificare a Regulamentului (CE) nr. 1580/2007 de stabilire a normelor de aplicare a Regulamentelor (CE) nr. 2200/96, (CE) nr. 2201/96 si (CE) nr. 1182/2007 ale Consiliului în sectorul fructelor si legumelor privind standardele de comercializare (Anexa I, partea B standardele secifice de comercializare şi Anexa I, partea A, standardul general de comercializare)

I.2 WINE

A. National Legislation

- ORDIN nr. 218 din 14 aprilie 2009 pentru aprobarea Normelor metodologice privind condiţiile de acordare a sprijinului financiar în vederea promovării vinurilor pe pieţele ţărilor terţe în campaniile viticole 2008/2009-2012/2013, cheltuielile eligibile, modalităţile de plată, de verificare şi control.
- ORDIN nr. 756 din 18 decembrie 2008 privind aprobarea Normelor metodologice de acordare a sprijinului financiar producatorilor din sectorul vitivinicol pentru asigurarea recoltei de struguri pentru vin.
- ORDIN nr. 581 din 15 septembrie 2008 pentru aprobarea Normelor privind acordarea sprijinului financiar producătorilor de vin care utilizează must de struguri concentrat şi/sau must de struguri concentrat rectificat în vederea creşterii tăriei alcoolice naturale a strugurilor proaspeţi, a mustului de struguri, a mustului de struguri parţial fermentat şi a vinului nou aflat încă în fermentaţie.

- ORDIN nr. 247 din 23 aprilie 2008 privind aprobarea Normelor de aplicare a programelor de restructurare/reconversie a plantatiilor viticole, derulate cu sprijin comunitar pentru campaniile 2008/2009 - 2013/2014.

- ORDIN 35/2011 pentru abrogarea pct. 4.3 din Normele de aplicare a programelor de restructurare/reconversie a plantaţiilor viticole, derulate cu sprijin comunitar pentru campaniile

2008/2009-2013/2014, aprobate prin Ordinul ministrului agriculturii şi dezvoltării rurale nr. 247/2008.

B. EU Legislation

- REGULAMENTUL (CE) NR. 361/2008 din 14 aprilie 2008 de modificare a Regulamentului (CE) nr. 1234/2007 de instituire a unei organizări comune a pieţelor agricole şi privind dispoziţii specifice referitoare la anumite produse agricole (Regulamentul unic OCP)

- REGULAMENTUL (CE) NR. 555/2008 AL COMISIEI din 27 iunie 2008 de stabilire a normelor de aplicare a Regulamentului (CE) nr. 479/2008 al Consiliului privind organizarea comună a pieței vitivinicole în ceea ce privește programele de sprijin, comerțul cu țările terțe, potențialul de producție și privind controalele în sectorul vitivinicol.
- REGULAMENTUL (CE) NR. 607/2009 AL COMISIEI din 14 iulie 2009 de stabilire a unor norme de punere în aplicare a Regulamentului (CE) nr. 479/2008 al Consiliului în ceea ce privește denumirile de origine protejate și indicaţiile geografice protejate, menţiunile tradiţionale, etichetarea și prezentarea anumitor produse vitivinicole.
- REGULAMENTUL (CE) NR. 606/2009 AL COMISIEI din 10 iulie 2009 de stabilire a anumitor norme de aplicare a Regulamentului (CE) nr. 479/2008 al Consiliului în privinţa categoriilor de produse viticole, a practicilor oenologice și a restricţiilor care se aplică acestora.

I.3. CEREALS

A. National Legislation

- Ordonanţa nr.14/2010 privind măsuri financiare pentru reglementarea ajutoarelor de stat acordate producătorilor agricoli, începând cu anul 2010, aprobată prin Legea nr.74/2010;
- Hotărârea nr. 408/2010 privind aprobarea acordării unui ajutor de stat pentru motorina utilizată în agricultură
- Ordin nr. 126/2010 pentru aprobarea procedurilor specifice de implementare şi control, precum şi formularistica necesară acordării unui ajutor de stat pentru motorina utilizată în agricultură cu modificările şi completările ulterioare;
- ORDIN nr. 73 din 10 aprilie 2012 pentru modificarea Procedurilor specifice de implementare şi control, precum şi a formularisticii necesare privind acordarea ajutorului de stat pentru motorina utilizata în agricultură, aprobate prin Ordinul ministrului agriculturii şi dezvoltării rurale nr. 126/2010
- Hotărârea nr.756/2010 privind normele metodologice referitoare la modul de acordare a ajutorului de stat în agricultură pentru plata primelor de asigurare;
- Hotărârea nr.759/2010 privind acordarea de ajutoare specifice pentru îmbunătăţirea calităţii produselor agricole în sectorul de agricultură ecologică;
- Ordonanta de urgenta nr.125/2006 pentru aprobarea schemelor de plati directe şi plăţi naţionale directe complementare, care se acordă în agricultură începând cu anul 2007, si pentru modificarea art. 2 din Legea nr. 36/1991 privind societaţile agricole şi alte forme de asociere în agricultură, cu modificările şi completările ulterioare.
- Ordin nr. 246/2008 privind stabilirea modului de implementare, a condiţiilor specific şi a criteriilor de eligibilitate pentru aplicarea schemelor de plăţi directe şi plăţi naţionale directe

complementare în sectorul vegetal, pentru acordarea sprijinului aferent măsurilor de agromediu şi zone defavorizate;

- Ordonanţa nr. 25 din 25 august 2010 pentru instituirea unei scheme de ajutor de stat temporare privind asigurarea accesului la finanţare în agricultură.
- în aplicare a prevederilor Ordonanţei Guvernului nr. 25/2010 pentru instituirea unei scheme de ajutor de stat temporare privind asigurarea accesului la finanţare în agricultură, inclusiv modul de calcul al ratei dobânzii la credit necesare pentru calculul subvenţiei, al ratei de referinţă şi al valorii nominale a subvenţiei.
- HOTĂRÂRE nr. 651 din 24 mai 2006 privind aprobarea Politicii în domeniul ajutorului de stat pentru perioada 2006-2013
- LEGE nr. 247 din 19 iulie 2005 privind reforma în domeniile proprietăţii şi justiţiei, precum şi unele măsuri adiacente (Titlul IX – Renta viagera)

B. EU Legislation

- Regulamentul CE nr. 73/2009 privind stabilirea normelor comune pentru sistemele de ajutor direct pentru agricultori în cadrul politicii agricole comune şi de instituire a anumitor sisteme de ajutor pentru agricultori.
- Liniile directoare comunitare privind ajutoarele de stat în sectorul agricol şi forestier 2007-2013
- Regulamentul (CE) nr. 1.857/2006 al Comisiei din 15 decembrie 2006 privind aplicarea articolelor 87 şi 88 din tratat ajutoarelor de stat pentru întreprinderile mici şi mijlocii care îşi desfăşoară activitatea în domeniul

I.4 SAFETY AND INSPECTIONS

A. National Legislation

- LEGE nr. 150 din 14 mai 2004 privind siguranţa alimentelor şi a hranei pentru animale
- Norma din 2010 privind fabricarea, transportul, depozitarea, comercializarea şi controlul oficial al temperaturii alimentelor congelate rapid, destinate consumului uman (M.Of. 805 din 02-dec-2010)
- H.G. nr. 1904/2006 pentru modificarea H.G. nr. 568/2002 privind iodarea universală a sării destinate consumului uman, hranei pentru animale şi utilizării în industria alimentară de către operatorii economici care fabrică pâine şi produse de panificaţie;

B. EU Legislation

- Regulamentului (CE) 589/2008 de stabilire a normelor de aplicare a Regulamentului (CE) nr. 1234/2007 al Consiliului privind standardele de comercializare aplicabile ouălor şi a O.M. nr. 461/2004 pentru aprobarea Normelor metodologice de aplicare a Hotărârii Guvernului nr. 415/2004 privind regimul de comercializare a ouălor;
- O.M. nr. 8/2013 privind recunoaşterea organismelor private de inspecţie şi certificare a produselor agricole sau alimentare şi de supraveghere a activităţii organismelor private de inspecţie şi certificare a produselor agricole ori alimentare ce au dobândit protecţia indicaţiilor

geografice (I.G.P.), a denumirilor de origine (D.O.P.) şi specialităţilor tradiţionale garantate (S.T.G);

- Regulamentul (CE) 882/2004, privind controlul oficial al alimentelor şi Planul Naţional Unic de Control Integrat pentru România 2013.

I.5 BIO AGRICULTURE

- HOTĂRÂRE nr. 418 din 26 iunie 2013 pentru completarea Hotărârii Guvernului nr. 759/2010 privind acordarea de ajutoare specifice pentru îmbunătăţirea calităţii produselor agricole în sectorul de agricultură ecologică
- HOTĂRÂRE pentru stabilirea măsurilor şi sancţiunilor necesare în vederea respectării prevederilor Regulamentului (CE) nr. 834/2007 al Consiliului din 28 iunie 2007 privind producţia ecologică şi etichetarea produselor ecologice, precum şi de abrogare a Regulamentului (CEE) nr. 2.092/91
- HOTĂRÂRE nr. 1303 din 15 decembrie 2010 pentru modificarea şi completarea Hotărârii Guvernului nr. 755/2010 privind schema de ajutor specific acordat producătorilor de lapte de vacă din zonele defavorizate şi a Hotărârii Guvernului nr. 759/2010 privind acordarea de ajutoare specifice pentru îmbunătăţirea calităţii produselor agricole în sectorul de agricultură ecologică
- HOTĂRÂRE nr.1095 din 2010 pentru modificarea Hotărârii Guvernului nr. 755/2010 privind schema de ajutor specific acordat producătorilor de lapte de vacă din zonele defavorizate şi a Hotărârii Guvernului nr. 759/2010 privind acordarea de ajutoare specifice pentru îmbunătăţirea calităţii produselor agricole în sectorul de agricultură ecologică

- LEGEA nr. 89 din 28 aprilie 1998 a apiculturii, cu modificarile si completarile ulterioare, publicata in Monitorul Oficial al Romaniei, Partea I, nr. 170 din 30 aprilie 1998;
- HOTARAºREA GUVERNULUI nr. 921 din 20 noiembrie 1995 privind unele masuri pentru stimularea practicarii apiculturii si asigurarea protectiei familiilor de albine, publicata in Monitorul Oficial al Romaniei, Partea I, nr. 281 din 04 decembrie 1995;
- LEGE nr. 566 din 9 decembrie 2004 a cooperatiei agricole cu completarile si modificarile ulterioare, publicata in Monitorul Oficial al Romaniei, Partea I, nr. 1.236 din 22 decembrie 2004;

I.6 PROMOTION

- REGULAMENTUL (CE) NR. 501/2008 AL COMISIEI din 5 iunie 2008 de stabilire a normelor de aplicare a Regulamentului (CE) nr. 3/2008 al Consiliului privind acțiunile de informare și promovare pentru produsele agricole pe piața internă și în țările terțe
- REGULAMENTUL DE PUNERE ÎN APLICARE (UE) NR. 1085/2011 AL COMISIEI din 27 octombrie 2011 de modificare a Regulamentului (CE) nr. 501/2008 de stabilire a normelor de aplicare a Regulamentului (CE) nr. 3/2008 al Consiliului privind acţiunile de informare şi promovare pentru produsele agricole pe piaţa internă şi în ţările terţe

I.7 STORAGE

- ORDONANŢĂ DE URGENŢĂ nr. 141 din 17 octombrie 2002 privind reglementarea depozitării seminţelor de consum, regimul certificatelor de depozit pentru acestea şi constituirea Fondului de garantare pentru certificatele de depozit

- LEGE nr. 53 din 19 martie 2010 privind aprobarea Ordonanţei Guvernului nr. 7/2009 pentru instituirea sistemului temporar de sprijinire a derulării afacerilor în domeniul comerţului cu seminţe de consum, precum şi pentru modificarea unor acte normative

I.8 PACKAGING

- HOTARAREA GUVERNULUI NR. 106/2002 privind etichetarea alimentelor, elaborata de Autoritatea Nationala pentru Protectia Consumatorilor, Ministerul Agriculturii, Alimentatiei si Padurilor si Ministerul Sanatatii si Familiei - Publicata in MO nr.147/27 feb.2002
- Hotararea Guvernului nr. 1719/14.10.2004 pentru modificarea si completarea HG nr. 106/2002 privind etichetarea alimentelor, publicata in MO nr. 1014/03.11.2004.
- HOTĂRÂRE nr. 173 din 9 februarie 2006 privind trasabilitatea şi etichetarea organismelor modificate genetic şi trasabilitatea alimentelor şi hranei pentru animale, obţinute din organisme modificate genetic
- HOTĂRÂRE nr. 924 din 11 august 2005 privind aprobarea Regulilor generale pentru igiena produselor alimentare

I.9 COMPETITIVENESS

- ORDONANTA DE URGENTA A GUVERNULUI NR. 120/2002 privind aprobarea Sistemului de sustinere si promovare a exportului cu finantare de la bugetul de stat, publicata in MO nr. 727/04 octombrie 2002
- HOTARAREA GUVERNULUI NR. 1557/2002 privind aprobarea mecanismului de acordare a sprijinului financiar de la bugetul de stat prin Programul de crestere a competitivitatii produselor agroalimentare, publicata in Mo nr.19/15 ianuarie 2003
- ORDONANTA GUVERNULUI NR. 74/2004 pentru modificarea Ordonantei de urgenta a Guvernului nr. 120/2002 privind aprobarea Sistemului de sustinere si promovare a exportului cu finantare de la bugetul de stat, publicata in MO nr. 774/24 august 2004
- HOTARAREA GUVERNULUI NR. 2206/2004 pentru modificarea HG 1557/2002 privind aprobarea mecanismului de acordare a sprijinului financiar de la bugetul de stat prin Programul de crestere a competitivitatii produselor agroalimentare, publicata in MO nr. 1234/21.12.2004

II. TEXTILES

- LEGEA nr.319 /2006 - securităţii şi sănătăţii în muncă
- HOTĂRÂRE nr. 699 din 11 iulie 2012 privind stabilirea unor măsuri pentru aplicarea Regulamentului (UE) nr. 1.007/2011 al Parlamentului European şi al Consiliului din 27 septembrie 2011 privind denumirile fibrelor textile şi etichetarea corespunzătoare şi marcarea compoziţiei fibroase a produselor textile şi de abrogare a Directivei 73/44/CEE a Consiliului şi a directivelor 96/73/CE şi 2008/121/CE ale Parlamentului European şi ale Consiliului
- HG nr. 1.510 /2008 - privind aprobarea Mecanismului de acordare a sprijinului financiar de la bugetul de stat prin Programul de crestere a competitivitatii produselor industrial

III. ENERGY EFFICIENCY AND GREEN ENERGY

- HG 835 /2010 privind modificarea Programului national pentru cresterea eficientei energetice si

utilizarea surselor regenerabile de energie in sectorul public, pentru anii 2009-2010, aprobat prin HG nr. 1661/2008. MO 574/ 12.08.2010

- Legea nr.329 /2009 privind reorganizarea unor autoritati si institutii publice rationalizarea cheltuielilor publice, sustinerea mediului de afaceri si respectarea acordurilor-cadru cu Comisia Europeana si Fondul Monetar International a stabilit preluarea activitatii Agentiei Romane pentru Conservarea Energiei (ARCE) de catre ANRE, atributiile referitoare la implementarea sistemului de reglementari necesar asigurarii eficientei energetice si promovarii utilizarii la consumatorii finali a surselor regenerabile de energie revenind Departamentului Reglementare in domeniul eficientei energetice

- HG 1661 /2008 privind aprobarea Programului national pentru cresterea eficientei energetice si utilizarea resurselor regenerabile de energie in sectorul public, pentru anii 2009-2010 MO 858 /2008
- HOTĂRÂRE nr. 750 din 9 iulie 2008 pentru aprobarea Schemei de ajutor de stat regional privind valorificarea resurselor regenerabile de energie
- HOTĂRÂRE nr. 248 din 27 martie 2012 privind modificarea şi completarea Hotărârii Guvernului nr. 750/2008 pentru aprobarea Schemei de ajutor de stat regional privind valorificarea resurselor regenerabile de energie
- HOTĂRÂRE nr. 462 din 5 aprilie 2006 pentru aprobarea programului "Termoficare 2006-2015 căldură şi confort" şi înfiinţarea Unităţii de management al proiectului
- HG nr. 638 /2007 privind deschiderea integrala a pietei de energie electrica si gaze naturale

IV. ITC

- LEGE nr. 140 din 18 iulie 2012 pentru aprobarea Ordonanţei de urgenţă a Guvernului nr. 111/2011 privind comunicaţiile electronice
- Legea nr.239/2005 privind modificarea şi completarea unor acte normative din domeniul comunicaţiilor
- Legea nr. 506/2004 privind prelucrarea datelor cu caracter personal şi protectia vieţii private în sectorul comunicaţiilor electronice
- HOTĂRÂRE nr. 290 din 2 martie 2006 pentru aprobarea Strategiei de stimulare a dezvoltării reţelei naţionale de incubatoare de afaceri

V. TOURISM

V.I Tourism Authorizations

- Hotărârea Guvernului 121/2013 privind eliberarea certificatelor de clasificare, a licenţelor şi brevetelor de turism
- HG 1267/18.12.2010 privind eliberarea certificatelor de clasificare, a licentelor si brevetelor de turism
- OG 107/1999 republicată privind activitatea de comercializare a pachetelor de servicii turistice
- OUG 19/2006 privind utilizarea plajei Marii Negre si controlul activitatilor desfasurate pe plaja
- Legea 274/2006 pentru aprobarea Ordonantei de urgenta a Guvernului nr. 19/2006 privind utilizarea plajei Marii Negre si controlul activitatilor desfasurate pe plaja

- HG 631/2003 pentru modificarea si completarea HG nr. 305/2001 privind atestarea si utilizarea ghizilor de turism

V.2 Tourism Promotion

- Hotărârea Guvernului 20/2012 privind aprobarea Programului multianual de marketing si promovare turistica si a Programului multianual de dezvoltare a destinatiilor, formelor si produselor turistice

V.3 Tourism Development

- HG 1271/21.12.2011 - ”Dezvoltarea urbană integrată în vederea reabilitării şi modernizării destinaţiilor turistice Borsec, Băile Herculane şi Sulina ca suport al activităţilor de turism durabil”
- HG 120/17.02.2010 - Lista cuprinzând programele şi proiectele de investiţii în turism şi a surselor de finanţare a documentaţiilor tehnice şi a lucrărilor de execuţie a programelor şi obiectivelor de investiţii în turism, precum şi pentru aprobarea criteriilor de eligibilitate a programelor şi proiectelor de investiţii în turism
- HOTĂRÂRE nr. 1220 din 14 decembrie 2011 pentru modificarea Hotărârii Guvernului nr. 120/2010 privind aprobarea Listei cuprinzând programele şi proiectele de investiţii în turism şi a surselor de finanţare a documentaţiilor tehnice şi a lucrărilor de execuţie a programelor şi obiectivelor de investiţii în turism, precum şi pentru aprobarea criteriilor de eligibilitate a programelor şi proiectelor de investiţii în turism
- LEGE nr. 418 din 16 noiembrie 2006 privind modificarea şi completarea Legii nr. 526/2003pentru aprobarea Programului naţional de dezvoltare a turismului montan "Superschi în Carpaţi"
- Hotarirea 77/2010 privind aprobarea Programului anual de marketing şi promovare şi a Programului anual de dezvoltare a destinaţiilor şi a produselor turistice