

SMART SPECIALIZATION - A DRIVER OF INCREASING COMPETITIVENESS

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ABSTRACT

Highlighted as a strategic instrument towards the targets of the Lisbon 2010 and Europe 2020 strategies, RDI specialisation has been a very frequent issue in the recent literature of the field.

Many of the official European documents have also emphasized that a more functional, integrated and strong European Research Area requires world-class European research centres that would attract best resources for high quality research, through the mechanism of „smart specialisation”.

Various and valid arguments have been made in favour of RDI specialisation. At the same time, some authors have warned on the potential pitfalls and weaknesses associated to specialisation, that would negatively bear on the flexibility of the European RDI system, on its adaptability and proper crisis response, on the functionality of the resource distribution mechanisms and on its attractiveness for international financial resources for R&D.

Building on the literature review, the most recent hypothesis and statistical indicators, the present paper looks into the RDI specialisation in Romania, its intensity and depth, its structure and characteristics that should be taken into consideration for future policies and strategies.

Key Words: R&D specialization, knowledge for growth, smart specialization, Innovation Union,

Introduction

Research-Development (R&D) specialisation has been given, recently, much space in the literature of the field. Correlated with the available and potential infrastructure and resources, on one hand, and with the industrial specialisation trends, it has been taken as a strategic tool towards economic growth and higher competitiveness in innovation. (2, 7, 8, 9, 10, 11, 16).

The European strategic documents acknowledge the role of R&D specialisation. A stronger, more competitive, functional and visible European Research Area is to be achieved, *inter alia*, through “**smart specialisation**”, a concept that introduce a mechanism that should stimulate the creation and development of world class European research centres.

Many authors have argued for the advantages of R&D specialisation, warning, at the same time, on the potential associated pitfalls and weaknesses that would significantly impair the flexibility and adaptability of the European R&D and Innovation system, on the functionality of the resource distribution mechanisms and on its attractiveness for international financial resources for R&D, etc. (11).

The very swift dissemination and assimilation of „smart specialisation” among practitioners transformed this theoretic concept, launched in 2008 by the literature of the field, into „a succes story in a short period of time, a perfect example of policy running ahead of theory”.¹ Yet, among many other studies, a recent paper points out to the difficulties that might challenge the implementation of the concept.

The theoretic discourse and arguments for the concept haven’t been, so far, grounded on empirical research. Nevertheless, the stories of economies with high competitiveness support the hypothesis of a specialisation pattern oriented towards higher innovation and increased contribution of scientific research and technologic development to smart growth, as it leads to economic and competitiveness growth „based on innovation driven pillar”.

1. RDI Specialisation and Europe 2020 strategic targets achievement.

It has been largely admitted that the European research base is excessively fragmented. Most of the public funded scientific research still stays within the national frontiers, many of the research programmes overlap, the

¹ Dominique Forey, Paul A.David, Bronwyn A.Hall: “ Smart Specialization. From academic idea to political instrument, the surprising career of a concept and the difficulties involved in its implementation”, MTEI Working Paper, November 2011

competitions between the research centres is weak and many of them lack the necessary so-called “critical mass” that would allow for world class performance (7, 8, 6, 10, 11, 14).

This fragmentation of the European R&D area hinders the centres of excellence creation able to draw the best resources of a specific research field and the emergence of strong investment gravitational centres. It has also been noticed that there are, currently, tendencies towards focusing, at the national as well as regional level, on developing and exploiting the expertise already acquired in traditional research fields. Thus, the efforts and preoccupation for identifying and encouraging new original expertise areas are neglected and avoided. This leads to a high level of uniformisation of the national knowledge bases, of resources scattering and squandering and to sub-optimal research centres that lack in international competitiveness and attractiveness to potential investors. (5,7 etc)

The international mobility and flexibility of the R&D encourage the natural process of highly qualified and specialised human resources concentration around the research centres that would mostly and best harness them. The private company R&D usually develops in the proximity of prestigious universities with significant research experience and expertise, while innovative services providers revolve around. It is a certain fact that those who understand and capitalize upon these pools of talents, ideas, services and infrastructure are the ones who will mostly gain and will continue to invest in them, raising the region’s attractiveness for new external R&D capacities and investments.

Therefore, developing an ERA based on strong European research centres that should replace the current nationally fragmented system, dissipated along too numerous scientific fields with low performance and expertise, represents a crucial prerequisite to achieving the Europe 2020 strategic objectives for R&D.

Under the flagship initiative *Innovation Union*, a new strategy to ensure the necessary background and conditions to achieve optimal levels of cooperation and competition among European research centres, is intended and applied. The benefits associated to the “agglomeration effect” would foster new RDI excellent clusters, internationally visible and competitive.

According to many specialists, the specialisation processes carry, at the same time, high risk of widening gaps between regions and countries, as they tend to polarise the free-moving human and financial resources around the economic and geographic areas that already enjoy recognition, expertise, human resources and developed infrastructure. The less developed regions (including Romania) having a low R&D potential might need to fight with the inability to develop their own R&D capacities (5,9).

In this respect, the “Knowledge for Growth” group has launched the concept of “smart specialisation” (1, 9), designed to lower this risk through creating, with properly conceived and syncretised national and European RDI policy tools, genuine opportunities for each country and region to identify its own potential for expertise and originality, to invest in its own process of developing specific R&D fields.

Duly implemented, *smart specialisation* is deemed to be the key for the best capitalisation on the national potential for sustained growth, through research and innovation, as well as for the development of inter-regional competitive advantage. This principle would support the efforts for emphasising the strengths and diminishing the weaknesses of the European R&D and Innovation system, such as excessive fragmentation, efforts overlapping, under investment, unfavourable framework for access to public funding, innovation and innovative entrepreneurship, etc.

Through smart specialisation in R&D and innovation, a new approach to limited resources exploitation is ensured. Each region and country would be able to identify its advantages that would allow them to excel in specific research and development fields, to gain the critical mass of knowledge and expertise and to improve the inter-sectoral knowledge transfer. Smart specialisation should be a bottom-up discovery process, based on SWOT analysis, entrepreneurial approaches, which would gather the main stakeholders and mobilise them to identify the best specialisation in R&D alternatives, suiting the specific competitive advantages of the respective region or country. (5,7,8, 9)

2. RDI specialisation determinants and indicators

The economic relevance of R&D specialisation increases as the newly created knowledge generates economic value, competitive advantage and higher social or/and economic performance.

The S&T specialisation patterns tend to evolve in tight correlation with the structures of the R&D systems. They also depend on the investment in R&D patterns and industrial structures. Their evolution is very slow, being determined by the level and course of investments, technological and scientific developments (16).

It is also confirmed by numerous studies that the technological specialisation patterns do not substantially change in the short run (16) as the scientific community and industrial sectors slowly react and adapt to the changes in the outer environment. The scientific paradigms and technologic trajectories are relative constant, in the absence of radical stimuli – such as financial shocks. Changes in the intensity or level of R&D investments, if not occurring within a particular S&T sector, but affecting the whole system, would not lead to the alteration of the initial relative specialisation pattern.

Scientific specialisation is expected to behave like a mirror of the technological development and innovation priorities. With regards to the indicators of scientific specialisation, the main challenge lays in the lack of relevant data for deep aggregation levels. The classifications following the socio-economic objectives and research

fields do not go further than a two-digit level, fact that, according to various authors (11), do not allow for reaching sound conclusions regarding the specialisation level in R&D.

The main indicators employed in the analysis of the specialisation level are related to the main sources of research funding (public sector, business sector, non-profit sector and external sources) and to the principal performing sectors (business, public, university and non-profit). The most frequently used variable is the *number of publications* in a given scientific research field. It is considered that the main publishing scientific areas mirror the priorities in funds allotment at the level of an entity, region or country, be they public or private.

Empirical findings show that scientific specialisation is mostly determined by the intensity of public expenditures drawn by university centres and research institutes. The geographical distribution of scientific specialisation is, also, influenced by academic research centres.

Available data, which draw mainly on English-language published work, are focused on life sciences. Most of the research work on the scientific specialisation is based on the SCI (science citation index) provided by the private company Thomson Scientific. Many authors elaborate on several shortcomings related to predominance of scientific journals over books; of natural, medical and engineering sciences over socio-economic, arts and humanist ones. Also, the international comparability regarding some of the engineering fields is limited.

Other variables used for analysing the profile and tendencies of a particular RDI specialisation pattern are the shares of government, business sector, high-education sector expenditures in GDP (GBOARD, BERD, HERD), the human resource stock in S&T (HRST, by various qualification levels, etc), etc. The available information regarding GBOARD emphasizes the thematical areas and R&D activities that the public actors consider to be of high priority, while BERD indicates the R&D investment patterns chosen by the private sector.

The specialisation index based on BERD can be expressed by economic activity sector.

Sectoral specialisation by funding source represents an important tool for analysing and improving the R&D policies, as higher convergence and synergy between private and public investment would support their efficiency and efficacy (1).

Scientific and technological specialisation does not depend solely on financial investment, but, as well, on available and attracted human resources. A structural analysis of the specialisation pattern is, therefore, very relevant, together with forecasting human resource stock structure and dynamic.

Some studies also use value added as a relative R&D specialisation indicator. Compared to the R&D investment level (mainly BERD), the added value provides a highly relevant performance indicator (7).

The complexity of R&D specialisation requires sound proper management that would use efficient R&D policy instruments. When designing and implementing R&D policies, policy makers should and can consider the information offered by R&D specialisation indicators, and on analysis regarding the relationships between variables, the co-evolution or disjunction between the R&D and industrial specialisation, etc.

3. Some aspects of RDI specialisation in Romania

The Romanian literature on RDI specialisation has been somehow scarce, even if there are some foreign research papers on the issue that refer to Romania. In 2007, initiated by IPTS for a ERAWATCH project, a study performed by a research team lead by NIFU STEP in cooperation with other well known institutions, such as SPRU, Logotech, Joanneum Research and Fraunhofer ISI, was published, covering 33 countries, inclusively Romania². It was meant to analyse the correlation between scientific research specialisation and the economic specialisation at the national level.

Structural indicators of R&D on one hand, such as the various R&D expenditure categories allotted to different research areas or socio-economic priorities, the distribution of human resources to various research fields, etc, were correlated with indicators belonging to the economic area, such as the value added structure, labour force structure, export structure.

GBAORD priorities in Romania present a very polarized specialisation, with some sectors highly specialised and others completely underspecialised. Thus during the period 2001-03, Romania was specialised in the socio-economic objectives of civil research, non-oriented research, land use, industrial research and agriculture. An important point of notice, is the sharp decline in specialisation in the objectives of defence and exploitation of space within a ten years horizon. The authors's conclusions underline the "tendency of "polarised specialisation". Highly specialised research fields co-exist with the areas with no specialisation. The most specialised research fields belong to the natural sciences, while the transportation equipment, electronic equipment and wood processing were the sectors with high technologic specialisation. There was no evidence of any correlation between S&T specialisation and economic specialisation".

According to the structure by BERD, the leading sectors in terms of shares during 2003 were the motor vehicles (16.2%), machinery (11.8%), electrical machinery (10.6%), petroleum (10.6%), mining (10.1%), IT services (7.5%), basic metals (7%) and research 3.9%). At the same time, the main beneficiaries of public funding of BERD were the petroleum, real estate, machinery, electrical machinery, research and IT services.

² Erawatch:R&D Specialization Project, Country Specialization Report-Romania, June 2006.European Communities 2007.

Romania was highly specialised in all natural sciences such as mathematics, physics, chemistry, material sciences, engineering, but also in multidisciplinary research. Regarding technological specialisation, Romania was specialised in the sectors of transport equipment, electronic equipment, office machinery, wood and publishing, basic metals and non metallic mineral products, textiles and wood and publishing.

Using a somehow similar methodology, we have analysed the evolution of indicators regarding the RDI specialisation in Romania, for the 2004-2010 period in order to reveal the changes took place during this period of time. We used data provided by Eurostat and the Romanian Statistic Yearbook for 2010.

The analysis of the distribution of the public research funds (GBOARD) to the various research fields showed that the general advancement of scientific knowledge was a priority for the government (40,9% in 2004 and 29,5% in 2009). But, during 2004-2010, the mentioned type of research activities diminished in favour of other research fields, with strong economic and social impact as: health, agriculture, education, energy, and environment. The research funds allotted to transport, telecommunication, infrastructure and industrial technologies and products were, also, diminished.

A structural analysis of BERD suggests that funds were mainly oriented towards the manufacturing industries (62,27% in 2004 and 43,59% in 2008). The auto industry raised its share from 17,78% in 2004 to 26,82% in 2008, while the percentages for machines and equipment decreased from 17,3% to 4,49%, as for plastics, oil and coal processing (from 27% in 2004 to 19,84% in 2008).

The most scientific researchers are working in engineering and technologic fields (50.5% in 2004 and 37.7% in 2009). The natural and exact sciences attract 17% of the researchers in 2004 and 17.5% in 2009. Other scientific fields that raised their share in the total number of researchers are: health sciences, from 11.9% to 14%, humanist sciences, from 5.9% to 10.1% and agricultural sciences from 5.7% to 6.7%.

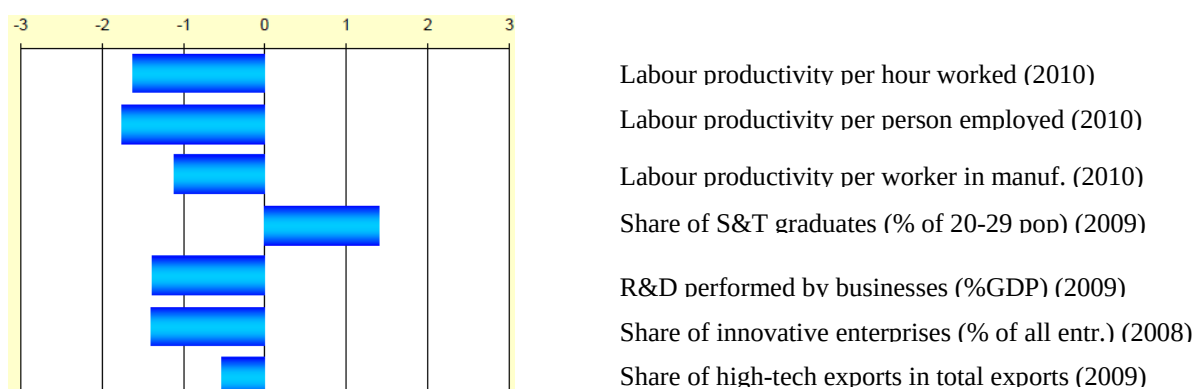
4. R&D Specialisation vs. economic specialisation. The impact on competitiveness

Romania lags well behind European and global average levels of competitiveness. While, as in previous years, according to GCR 2011-2012, top 10 countries remains dominated by a number of European countries as Sweden, Finland, Denmark, Germany and Netherlands, confirming their place among the most competitive economies, Romania ranks the 77th from 142 analysed countries, keeping its downward trend (rank 67th in GCR 2010-2011 and 64th in GCR 2009-2010). In 2010, Romanian economic productivity was only 42% of the EU 27 average level of the same year.

Figure no. 1

Romania vs EU average regarding competitiveness indicators

Distance from the EU average (measured in standard deviation)



Source: EU Industrial Structure – 2011. Trend and performance, EC, 2011

Economic convergence and 2020 growth targets involve narrowing the gaps above. Smart growth should be grounded in sound competitiveness pillars, among the weakest for Romania in 2010 has been the Innovation. Its main dimensions are *Capacity for innovation, Quality of scientific research institutions, Company spending on R&D, University-industry collaboration in R&D, Government procurement of advanced technology products, Availability of scientists and engineers, Utility patents and Intellectual property protection.*

If other competitiveness indicators Romania's position is higher in the hierarchy, the indicators of Innovation pillar rank Romania the 99th, with a score of only 3.2. (Table no. 1)

Table no. 1

Romania ranking according to Innovation indicators, GCR 2011-2012

No.	Indicator	Score	Rank
1	Capacity for innovation	2.9	78
2	Quality of scientific research institutions	3.2	91
3	Company spending on R&D	2.9	87
4	University-industry collaboration in R&D	3.0	115
5	Government's procurement of advanced tech products	3.1	111
6	Availability of scientists and engineers	4.2	59
7	Utility patents granted/million pop	0.8	62

Sursa: Global Competitiveness Report 2011-2012, p.305

Private sector funding of RDI and the linkage between university and industry are weaknesses of the Romanian RDI system, compared to the countries ranking in the top of the global competitiveness hierarchy. (Table no. 2)

Table no. 2

Innovation indicators for countries ranking high and low in the competitiveness hierarchy

	% BERD in GDP	Innovative SMEs collaborating with other	Private - public co-publishing per 1 million population	% SMEs innovating in house	% SMEs introducing product or process innovation	PCT patent application in GDP * billion at PPP
EU 27	1.25	11.16	36.2	30.31	34.18	4.0
Romania	0.19	2.27	6.3	16.66	18.03	0.15
Poland	0.18	6.40	2.5	17.55	13.76	0.31
Hungary	0.66	7.15	19.6	12.6	16.82	1.54
Netherlands	0.88	12.97	90.0	26.27	31.58	6.44
Austria	1.94	14.71	56.3	34.37	39.55	5.05
Switzerland	2.20	9.40	198.5	28.20	57.0	9.13
Sweden	2.54	16.51	117.3	37.02	40.59	11.02
Finland	2.83	15.30	104.7	39.60	41.83	9.96
Denmark	2.02	22.68	123.2	40.81	37.63	8.02
Germany	1.92	8.95	49.5	46.03		7.72

Source : Selection based on Innovation Union Scoreboard, 2010, p.62,63

In the context of the long and largely acknowledged strong and direct correlation between the RDI performance and the dynamics of the competitiveness level, based on numerous theoretical as well as empirical studies, smart specialisation appears to be an important potential bondage and channel between research, development and innovation on one hand, and economic performance and growth. This is foremost because it does not endorse mere innovation, but underpins structural changes that may bring forth higher future economic value through innovation and new knowledge. The structural shifting from old, declining activities to new domains that are emerging, actually, from already existing industrial commons supporting innovation (such as collective R&D, engineering, manufacturing capabilities) may be generated through smart specialisation strategies.

Therefore, smart specialisation strategies, adequately built and implemented, should bring forth significant improvement for many of the competitiveness indicators at the regional, sectoral and, eventually, national levels. Yet, at it has previously been commented on, it is important that it capitalizes upon a synergetic correlation between industrial, economic advantages and specialisation on one hand, and RDI capabilities and expertise on the other.

According to the ERAWATCH study on RDI specialisation (2), the top competitive countries display consistency between their economic and R&D specialisation patterns. The analysis ³ shows relevant correlation between BERD, considered an indicator for RD specialisation, and other indicators that stand for economic specialisation (value added, patents, exports, etc). The patenting structure confirms also that technological specialisation is in accordance to both industrial and R&D specialisation. The industrial strength and the competitive position of Germany in the sectors of motor vehicles, machinery, instruments, plastics, fabrication of metals and chemicals are clearly accompanied by technological specialisation and RD specialisation in the same areas

³ ERAWATCH – R&D specialisation project / WP1 /Country Reports for Germany, Denmark and Netherlands, European Commission, 2007

Denmark also presents a very consistent specialisation profile, in terms of research, economic and technological specialisation. Thus it appears specialised in a large number of services sectors, such as community services, business activities, IT services and telecommunications etc. Similarly, it is also specialised in a large number of research-intensive manufacturing sectors such as instruments, machinery, plastics and pharmaceuticals. There is a strong correlation between economic specialisation, BERD and technological specialisation, which stands for both periods under examination. The interdependence between the various specialisations is stronger in the manufacturing sector.

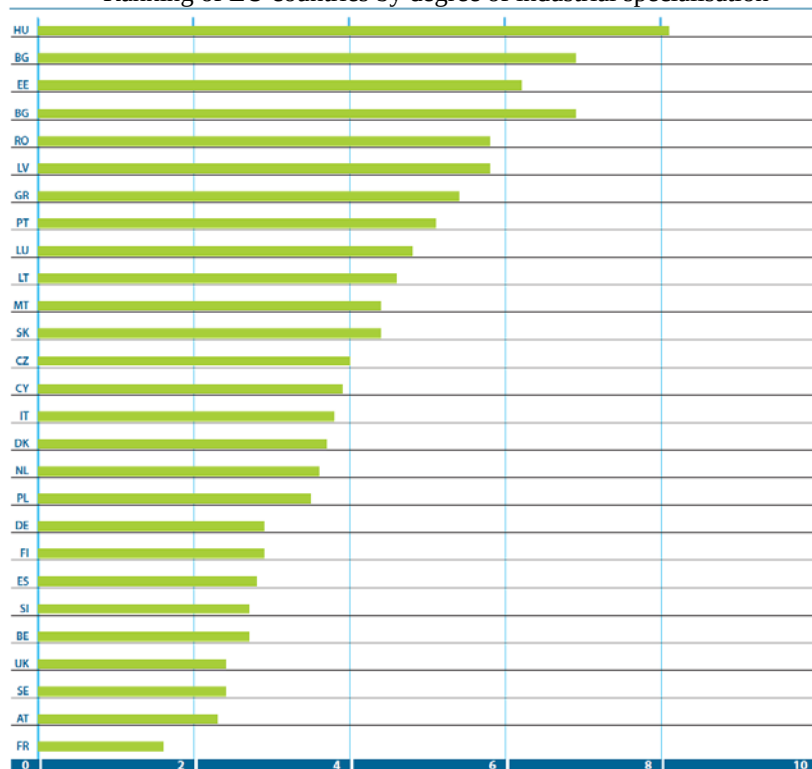
For **Netherlands**, there are some relative important correlations between economic, technological and BERD specialisations..An important correlation exists between value added and BERD. The most consistent correlation appears to be that between BERD and patents.

In Sweden, The public funding of BERD, is directed toward sectors that exhibit strong or relatively strong specialisation, such as office machinery, research and various services sectors. What is notable in the case of Sweden is that public funding for BERD is dispersed at a relatively small number of sectors compared to other countries such as Germany and France. Sweden appears to be gaining in specialisation in some fast growing sectors such as pharmaceuticals and IT services and in some medium to low growth sectors in manufacturing, such as office machinery and electronic equipment

According to some calculations based on the relative specialisation index (ISR) (the reference unit is EU 27 average), Romania ranks among the highest specialised European Countries (see fig.nr.2) (6).

Figure no. 2

Ranking of EU countries by degree of industrial specialisation



Source: EU Industrial Structure – 2011. Trend and performance, 2011, using Eurostat data

As it has been previously mentioned, a high degree of relative specialisation (calculated according to the IRS) does not mean that the sector in question represents a large share in the economy, but it represents, in proportion, more than in the other European countries. The ranking for Romania, as well as for Bulgaria, is owed to agriculture sector in which both countries show high specialisation.

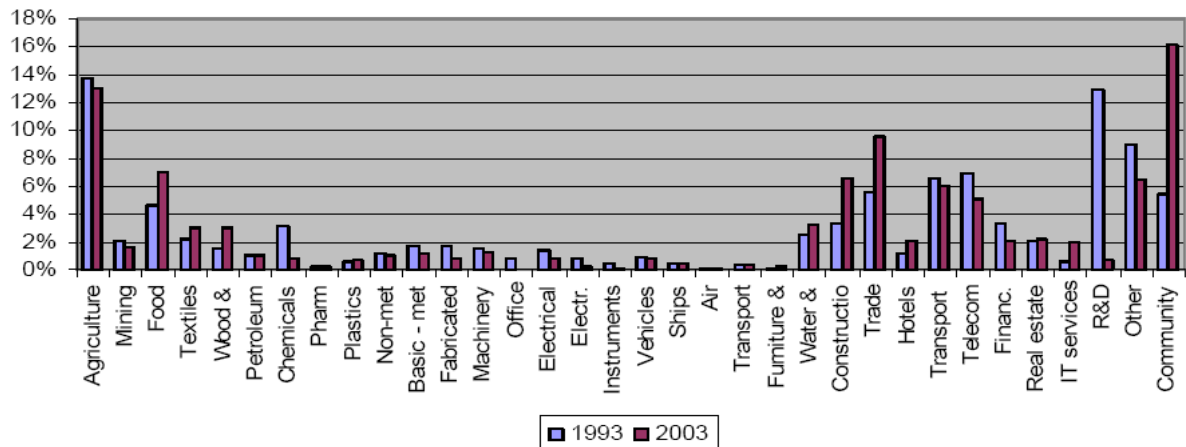
It is also acknowledged that low specialisation may imply high potential for diversification. As it may be seen in the chart above, large and developed economies are also more diversified and less specialised.

With a higher share of Manufacturing in total Value Added comparative to the EU average (22.4% vs 14.9% in 2007), Romania remains mainly specialised in labour-intensive industries (such as textile fibres, wearing apparel and accessories, etc), in capital-intensive industries (like cement) and marketing-driven ones (value added only).

In Romania, during the period 2001-03, the economic specialisation was concentrated in the sectors of agriculture, food, textiles, wood and publishing, petroleum, basic metals, non metallic mineral products, shipbuilding and transport, sectors that are not innovation-driven.

Figure no. 3

Shares of total value added by industrial sector in Romania, in 1993 and 2003.



Source : Erawatch:R&D Specialiation Project, Country Specialization Report-Romania, June 2006.European Communities 2007

At the more aggregated sector level, Romania features specialisation in low innovation and education sectors (wearing apparel, leather), but also in medium-high innovation sectors (textiles, basic metals). Romania's R&D intensity considering its industrial structure is below average and its position on the quality ladder is far below the EU average.

According to the same EU study (6) the sectors that have registered increased specialisation during the last decade belong to services: *sale, maintenance and repair of motor vehicles, retails sale of fuel, computer and related activities, real estate activities*, etc. Decreasing specialisation occurred in some manufacturing sectors (wearing apparel, dressing and dying of fur, tobacco products), as well as in water supply.

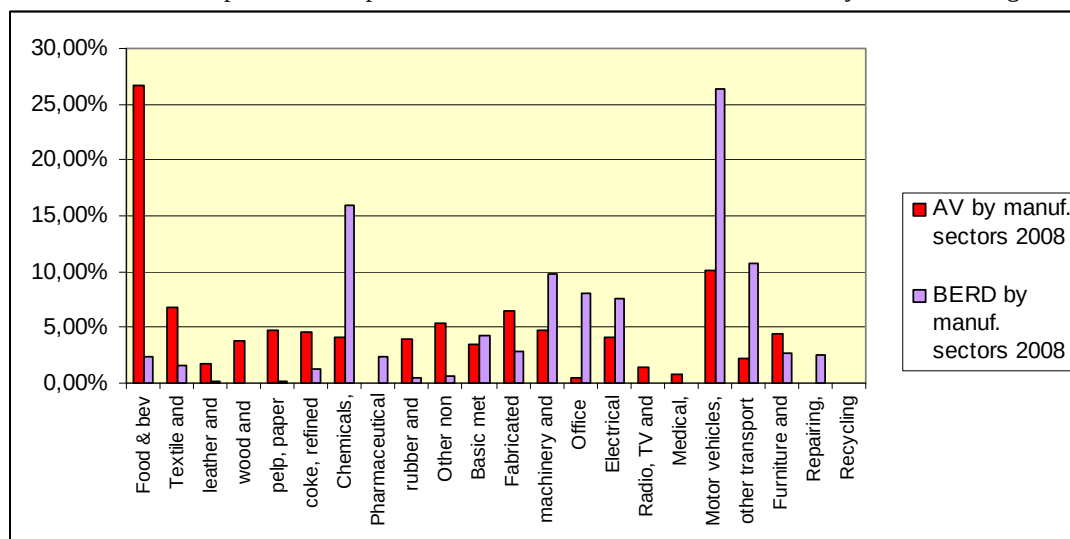
The RDI specialisation pattern for Romania, as it has been presented in the previous chapter, if one can be depicted, doesn't seem to be anyhow correlated with the economic and industrial patterns (Figure no. 4)

It may be noticed that, during the last ten years, there has been registered an increase of the share of technology-driven industries (radio and TV transmitters and receivers) and of mainstream manufacturing as well as of high-education and innovation-intensive sectors, in total value added. The specialisation level in labour-intensive industries and low innovation and education sectors has been on a downward trend, while the quality has increased.

Still, with reference to technology driven industries, Romania lags behind regarding quality. It seems that the crisis has encouraged the change in specialisation pattern towards the knowledge-intensive, at the expense of capital-intensive industries. Therefore the sectoral R&D intensity has been declining relative to the EU average.

Romania is catching up with respect to competitiveness as evidenced by quickly changing structures, but needs to pay more attention to sectoral upgrading in terms of quality and R&D. Figure no. 4

Economic and RDI specialisation patterns: Added Value vs BERD structures by manufacturing sectors.



Source: Eurostat database

Low levels of business R&D and innovation in Romania, both in large firms and SMEs, are rooted in turn, in several effects, as: a low share of SMEs innovating in house and consequently of SMEs introducing new innovative products and technologies. The reluctance of firms to take on financial and commercial risks arising from R&D and innovation, poor financial services and instruments to mitigate risks have a direct effects on awareness of innovative SMEs to collaborate with other enterprises or institutions, even in the field of publications (6).

At the same time, the panel of innovation policy instruments applied for improving the under-involvement of the private sector in RDI is not very rich, consisting mainly of direct instruments and insufficient indirect instruments.

Existing instruments, such as the OP *Increase of Economic Competitiveness* and other legislative documents and policy measures are meant to increase the R&D capacity, to ensure adequate funding for ongoing research programmes, to improve efficiency and effectiveness of RDI, to simulate private sector involvement, to ensure uniform procedures for evaluation and monitoring of RDI activities.

There are still challenges ahead that require proper political approach: stronger partnerships and links between industry, university and R&D institutions, better adjust research to market needs, the shortage of a medium and highly skilled labour force, higher innovative potential of enterprises, better technology transfer and better functional and developed business support infrastructure.

Moreover, the OP *Increase of Economic Competitiveness* provides support for several R&D and innovation activities with the aim of increasing the R&D capacity, stimulating the cooperation between R&D and innovation institutions and enterprises, and increasing the enterprises' access to R&D and innovation. In addition, the adoption at the end of 2010 of the Public-Private Partnership Law created the legal basis in order to foster investments, including those in R&D.

Therefore, in order to ensure adequate funding for ongoing research programmes the Romanian government adopted in May 2010, in line with the conditionalities attached to the Memorandum of Understanding (MoU) of the EU financial assistance to Romania concluded in June 2009 in the framework of the EU-IMF adjustment programme, there has been created a plan setting out a number of measures with a view to improve the efficiency and effectiveness of R&D and innovation. These measures aim at facilitating the adjustment to more limited financial resources, ensuring the consistency of R&D and innovation policies and programmes, stimulating private sector activities, as well as establishing and implementing uniform procedures for monitoring and evaluation of R&D and innovation activities.

The challenge remains to increase the innovative potential of enterprises, particularly SMEs. Another major challenge is to improve technology transfer and the business support infrastructure (incubators, technology transfer offices, science and technology parks and clusters) which is still underdeveloped and poorly functional, in spite of recent significant improvements. In this respect, there are bottlenecks in the absorption of foreign technology as well as challenges to reduce high innovation costs, particularly for SMEs, which could be addressed through appropriate assistance programmes, the availability of information regarding technology, and facilitating access to financing instruments.

Moreover, partnerships among industry, university and R&D institutions could be improved and public funding could be used more to leverage private sector investments, strengthen links between business and research institutes and better adjust research to market needs.

Meeting the challenges above – specific to the whole Romanian RDI system, policy makers need also identify the most proper strategies for smart specialisation, following the entrepreneurial process of discovery.

Given the Romanian agricultural and forestry potential, we might look into the good practice example of Finland which experienced a successful pattern of smart specialisation, when nano-technological and biotechnological research fed into the traditional manufacturing sector of paper and pulp. Following an entrepreneurial process which discovered the need and room for a new approach of industrial processes modernization, the private sector R&D directly and substantially supported the innovative process.

Other traditional industrial sectors that re flourished through smart specialization are fishery and food manufacturing. ITC and nanotechnology applied to these sectors optimized the capitalization on the available resources of specific regions, leading to higher productivity, quality and, eventually, higher competitiveness. The opportunity to correlate available resources, capabilities and expertise with innovative production methods emerging from R&D represents a major premise for a smart specialisation strategy.

Another pattern of accomplishing structural change through smart specialisation follows the assumption of synergically coupling an already existent industry with a new, and yet underdeveloped, one. This might attract resource flows to new profitable economic activities, as well as entrepreneurial initiatives supported by effective financial intermediation. A major prerequisite is, therefore, finding adequate financial resources that might be able to exploit the economic opportunities through RD and start-ups. Fiscal instruments might be an important tool for encouraging the public-private partnership for spotting and attracting the necessary financial capital.

Smart specialisation may also be accomplished through radical structural changes in a specific region through the emergence of a new and distinct industrial activity, based on distinct R&D and Innovation. That involves, mainly, approaching a profitable market niche through the simultaneous advent of a new RDI activity and of a new business, as well. This represents a good opportunity for putting together outer RD resources and management with local expertise and resources. We may mention, for an example, the development of IT

applications for the management and maintenance of the environmental, cultural and archeological heritage together with applying this new knowledge with a view to create a sustainable business in local tourism industry.

Conclusions

R&D specialisation represents an important element for implementing in Romania of the Europe 2020 strategic targets. Promoting and implementing “smart specialisation” could be one of the key solutions for the elimination or mitigation of the RDI national system fragmentation, the dissipation of the already shrunk budgets on multiple, uncorrelated research spheres and objectives. It would usher the concentration of resources on fields with high expertise that would turn attractive for domestic or external private investors.

In Romania, the public funds have been allotted mainly to research projects meant to enrich the knowledge base and, also, to industrial research that concentrates a significant share of the human resources.

Therefore, it is important to give significant consideration to the level of correlation between the funded industrial research, especially business expenditure for research and development and the structural industrial changes on one hand, and the final contribution it brings to advancement of future cutting-edge industries.

Smart specialisation does not endorse mere innovation, but underpins structural changes that may bring forth higher future economic value through innovation and new knowledge. The structural shifting from old, declining activities to new domains that are emerging, actually, from already existing industrial commons supporting innovation (such as collective R&D, engineering, manufacturing capabilities) may be generated through smart specialisation strategies.

As a tendency in economic specialization in Romania during the last ten years, there has been registered an increase of the share of technology-driven industries (radio and TV transmitters and receivers) and of mainstream manufacturing as well as of high-education and innovation-intensive sectors, in total value added. The specialisation level in labour-intensive industries and low innovation and education sectors has been on a downward trend, while the quality has increased. There is no a correlation between R&D specialisation and economic specialisation for many manufacturing branches, especially food and beverage, chemistry, motor vehicles.

Still, with reference to technology driven industries, Romania lags behind other European countries. It seems that the crisis has encouraged the change in specialisation pattern towards the knowledge-intensive, at the expense of capital-intensive industries. Therefore the sectoral R&D intensity has been declining relative to the EU average.

Romania is catching up with respect some indicators of competitiveness by quickly changing structures, but needs to pay more attention to innovation pillar, sectoral upgrading in terms of quality and R&D.

Low levels of business R&D and innovation in Romania, both in large firms and SMEs, are rooted in turn, in several effects, as: a low share of SMEs innovating in house and consequently of SMEs introducing new innovative products and technologies.

The implementation of smart specialisation calls for more cooperation and collaboration between university and industry. It requires, and creates opportunities for, synergetic convergence between smart specialisation policy and policy oriented to entrepreneurship, young innovative companies and the openness of society. Smart specialisation in itself is a concept and strategy that imply important connections between research institutes and universities and business environment and strong entrepreneurship.

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