

## SOME ASPECTS OF RESEARCH AND DEVELOPMENT AT ENTERPRISES AT REGIONAL, COUNTRY AND EUROPEAN LEVEL

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**Abstract:** *The economical development and success of a firm are strongly influenced by research and development, dealing with renewals technology, keeping and raising market competitiveness, developing new ways to exploit.*

*This paper presents statistical analysis and conclusions on research and development at enterprises in the 7th Center Region of Romania, at country (Romania) and at European level.*

**Keywords:** *research, development, region, country, EU*

### 1. INTRODUCTION

An organization must be good at developing and managing new products. Every product seems to go through a life cycle -it is born, goes through several phases and eventually dies as new products appear that serve better user needs. This cycle has two major challenges: firstly because all products eventually decline, a company must be able to develop new products to replace old ones. Secondly, the company must be able to adapt its marketing strategies to changing and to compete with the help of the research function.

In literature research and development are defined as key factors for competitiveness and long-term benefits of customer and preference for technology and costs. (Mares, 1973)

### 2. CONSIDERATIONS ON RESEARCH AND DEVELOPMENT

Fundamental Inspection by Mares seeks knowledge and understanding of the world around us, as opening a new perspective by expanding the universe explaining reality. (Mares, 1973)

Stages of research are: documentation and observation of facts, data collection and classification of these, the preparation of conducting research.

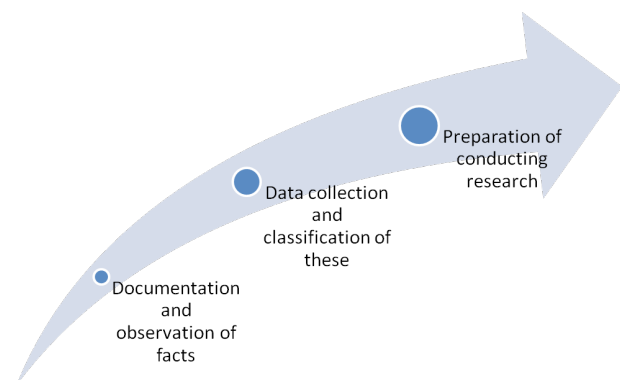


Fig.1. Stages of research

The best known definition of sustainable development is certainly the one of the World Commission on Environment and Development (WCED) in its report "Our Common Future", also known as the Brundtland Report: "Sustainable development is development that aims to meet the needs of the present without compromising the ability of future generations to satisfy their own needs". Given the rapid changes in consumer tastes, technology, and the competition among companies need to produce a steady stream of new products and services. A firm can obtain new products in two ways. One is the purchase and through its own research and development department. When we say products we mean original products, better products, product changes and to new brands that the company created through its research and development efforts.

Research and development function is represented by the activities taking place within the organization to achieve the objectives of the production of new ideas and transform ideas into useful news its future development. (Mares, 1973)

Activities of research and development function are:



Fig. 2. Center Region: Alba, Sibiu and Mures, Harghita, Covasna, Brasov counties

Central Development Region, with a total area of 34,100 km<sup>2</sup> (14.31% in Romania) includes Alba, Brasov, Covasna, Harghita and Sibiu and Mures counties. It's an area with specific plateau landforms, east-west oriented valleys, the region has important reserves of natural gas, gold and silver and therapeutic mineral springs, and over a third of the area is occupied by forests. (ROP, 2007:96)

With a population of 2,530.486 inhabitants in the region is concentrated 11.7% of the total population. Regional average of 74.2 inhabitants/km<sup>2</sup> is lower than the national highest density is in Braşov (111.4 inhabitants/km<sup>2</sup>) and Alba is below the regional average (60.7 inhabitants/km<sup>2</sup>), Covasna (60.3 inhabitants/km<sup>2</sup>), Harghita (49.2 inhabitants/km<sup>2</sup>).

From an economic perspective, the region is well balanced, with a still important weight of industry.

In 2008, the GDP / capita in the Central Region, expressed at standard purchasing parity (conventional currency unit which excludes the influence of price differences between countries), was 11,250 Euros (44.8% of the EU average). (ROP, 2007)

In industrial terms the region is represented by the construction industries of machinery, metal processing, chemical, pharmaceutical, building materials, timber, mining, textiles and food industries. (ROP, 2007)

Industrial specificity is more pronounced in Brasov and Sibiu counties, with significant industrial tradition. Rich natural resources in the region, particularly natural gas and salt, led to the development of chemical industry. In 2007, in the Central Region were obtained 42.2% of the volume of gas extracted nationwide and 40.8% of the national production of fertilizers. Wood processing industries recover important forestry coverage of the region. Thus, in the Central Region is obtained 46% of the national production of timber and about 20% of the furniture. (ROP, 2007)

The potential of the Centre Region is diversified as it has natural resources and human, social and economic resources as well. University network of Central Region is well developed; the universities from Targu Mures are renowned in the following domains: pharmaceutical, medicine and theater arts, Brasov is known for its technical profile and forestry, Sibiu for human profiles.

With a tradition in wood processing industry, it is understandable the presence of three research institutes dealing with this area.

Table 1. Research - Development  
in 7 Centre Region  
-mil. lei-

Total R & D spending	2006	2007	2008	2009	2010
Total	1565802	2177335	2980674	2356907	2413467
Northeast	107503	163561	214619	157869	158149
Southeast	54303	80630	99211	91591	89095
South-Muntenia	145750	231770	229496	220771	240751
Southwest Oltenia	53961	67793	88164	75738	70137
West	69434	11583	153300	89027	115808
Northwest	116664	193458	253612	194256	197378
<b>Center</b>	<b>60920</b>	<b>74256</b>	<b>80256</b>	<b>170057</b>	<b>110483</b>
Bucharest-Ilfov	957267	1254284	1862016	1357602	1431666

The 7 Center Region ranks 5th of the 8 regions, after the total expenditure in research - development, with a downward trend in the last few years.

In 2006 the Center region of Romania had a 60920 million lei spending on research and development, in 2007 this increased to 74256, in 2008 to 80256. In 2009 took place a significant increase to 170057, than it decreased to 110483 million lei.

#### 4. RESEARCH AND DEVELOPMENT IN ROMANIA

In 2011, Romania spent 2.786,8 million lei for research and development. Research and development expenses represented 0.48% of GDP, up 0.01 percentage compared to 2010, and up 0.02% compared to 2009.

In late 2011, 42,363 employees worked in research and development, the number of employees increased by 3298 compared to that recorded at the end of 2010.

In 2011 2,786,8 million lei was spent on research and development in the four areas of performance, of which 2,251,5 million lei current expenditure respectively 80.8% and 535.3 million lei capital expenditure 19.2% respectively.

The share of capital expenditure for equipment for units that have carried out research and development increased by 3.9 percentage in 2011, compared to 2010.

In 2011, basic research has increased slightly by 0.5 percentage in total spending compared to 2010 and from 42.9% to 43.4%.

Applied research in 2011 had decreased markedly by 10.8 percentage in total expenditure, and from 50.0% to 39.2%.

Experimental development, showed a significant increase of 10.8% percentage of total expenditure in 2011 compared to 2010.

After funding sources of total R & D expenditures in 2011, public funds have the highest proportion, namely 49.1%, followed by sources from enterprises, a slight increase of 1.1 percentage compared to 2010 (33.4% to 32.3%).

Government sector (55.4%), received the largest amount of money from public funds followed by higher education sector (31.1%).

Sources of funding for R & D from abroad were mostly oriented towards higher education sector units (43.4%) and the government sector (34.1%). Research intensity (the ratio of total R & D expenditure to gross domestic product) in 2011, had a share of 0.48%, similar to that recorded in 2010.

Expenditure from public funds has a share in GDP of 0.23% in 2011, with 0.05 percentage less than in 2010.

#### 5. CURRENT STATUS OF RESEARCH AND DEVELOPMENT IN THE EUROPEAN UNION

Expenditure on research and development (R & D) at enterprises (% of GDP) include all expenses/costs incurred for research and development in the real sector (enterprises, business) of the economy.

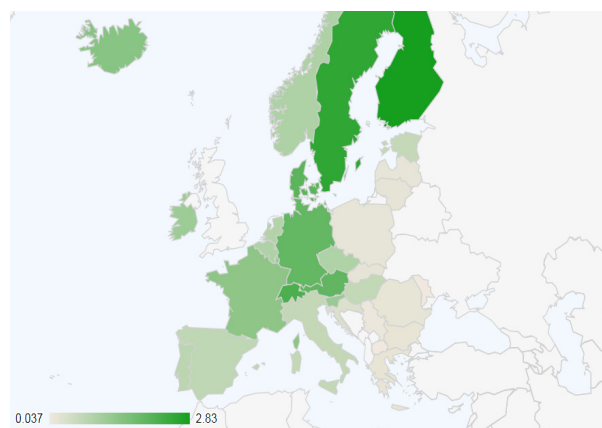
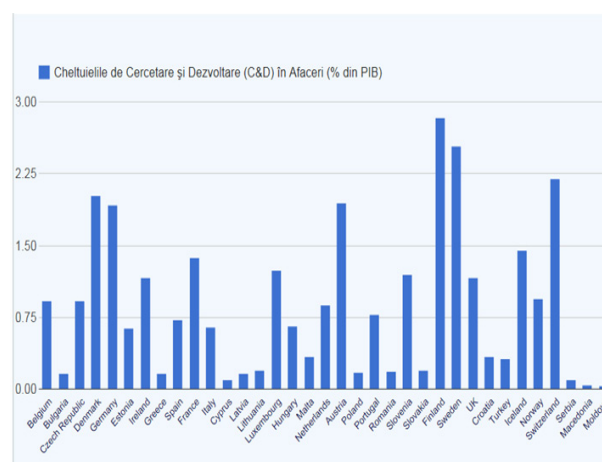


Fig. 3. (a), (b) Expenditure on research and development (INNOBAROMETRU)

The treaty of Lisbon provides for spending 3% of GDP on research and development. In 2010 the 27 EU countries are placed at the level of about 2.01% of GDP. Romania is placed at level of about 0.5 % of GDP. Finland is at first place of the chart, he has spent around 2.75 % of GDP on research and development, while Moldova is at the bottom of the classification.

## 6. CASE STUDY: THE CORRELATION BETWEEN R&D EXPENDITURES AND GVA. IN ROMANIA (2009-2011)

Gross value added (GVA) is a measure in economics of the value of goods and services produced in an area, industry or sector of an economy.

It can be determined by the synthetic method: add margin trading and margin leasing activity and minus the intermediate consumption of the production year. It can also be determined by the distribution method (additive) that summarizes personnel costs, taxes, depreciation and profit operation.

Considering the literature, we can say that there is a close connection between R & D expenditures and gross value added, if we consider GVA as a quantified, measured result of investments in R & D.

Knowing that research and development expenses, gross value added and GDP in the last three years (2009-2011) in Romania were:

Table 2. R&D expenses, GVA and GDP in the last 3 years - mil. lei-

	2009	2010	2011
R&D expenses	2356907	2413467	2786800
GVA	431763,7	445119,4	483364,1
GDP	480853,4	492875,4	535386,4

Graphical representation of the relationship between the two variables is shown in figure 4, where on OX is placed research and development expenses and the gross value added on OY.

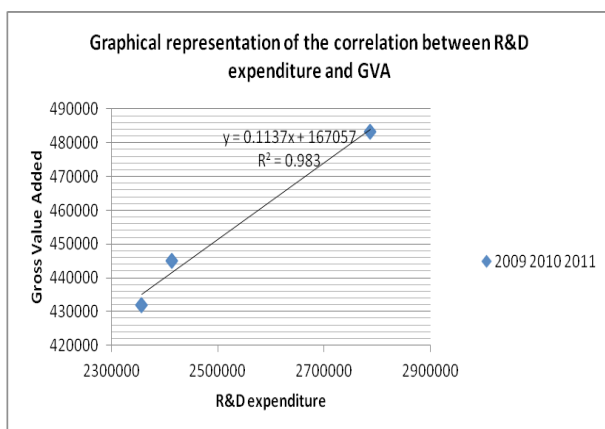


Fig. 4. Graphical representation of the correlation between R& D expenditure and Gross Value Added.

From table 2. we extracted the values, between 2009-2011, using Microsoft Excel's Correl function, we achieved that the coefficient is close to 1 (0.98), which means a direct connection, of high intensity. We can conclude that based on the trends of R&D expenditure we can forecast the trends in Gross value added, which is important in GDP's calculation.

## 7. CONCLUSIONS & ACKNOWLEDGMENT

In conclusion we can say that the importance of research and development function lies in the need for permanent adaptation of enterprises at regional, country and European level to the new achievements of modern science and technology, because science is a vector of social development.

Research and development is one of the most significant factors of innovation. It is assumed that they have a direct impact on the activities performed in a business and spending on research and development is a way to measure a country's innovative potential. Furthermore based on the trends of R&D expenditure we can forecast the trends in Gross value added, which is important in GDP's calculation.

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