

## THE RESOURCE DECOUPLING IMPORTANCE FOR SUSTAINABLE PRODUCTION IN ROMANIA

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### Abstract

*In this paper we aim to emphasize and to analyse the importance of resource decoupling for securing a sustainable production and economic growth in Romania. Increasing the resource-efficiency is a strategic objective which should be seen in the context of the European Sustainable Development Strategy and global efforts to achieve a transition towards a resource-efficient, circular and green economy, by decoupling growth from resource use. Some theoretical and methodological background issues are introduced for a deeper understanding of the most important concepts which underpin the current objectives and trends of sustainable economic growth: resource efficiency, resource productivity, resource decoupling. We outline the role of the resource productivity indicator in assessing progress towards the most important objectives of relevant strategic documents for sustainable and resource-efficient economic development in the European Union and Romania. In the tables and graphs presented in the paper, we shall try to compare the level and evolution of key statistical indicators, in Romania and in EU-27, to check the main trends in resource decoupling, the impact of the economic crisis as well as whether these trends may be consistent with the principles of a sustainable consumption and production. The conclusions and recommendations are based on the finding that, in the analysed period 2002-2013, the decoupling of economic growth from the resource use was achieved in Romania due to the economic crisis time (2008-2010).*

**Key words:** decoupling, green economy, resource-efficient, resource productivity, sustainable economic growth

### INTRODUCTION

Sustainability has become an over-arching global social, environmental and economic imperative among governments, international organizations, and the private sector.

The political leaders have increasingly understood that making progress towards a more sustainable economy requires an absolute reduction in resource use at a global level, while human well-being demands that economic activities should expand and environmental impacts diminish [9].

In this respect, the main objective of the paper is a theoretical and methodological grounding and analysis of some concepts, trends and issues required for the implementation of the SDS (Sustainable Development Strategy) in the EU and Romania, as well as for the transition to a resource efficient and greener economy.

We explain in more detail the meaning and relationships featuring sustainable economic

growth, focusing on the concept of resource efficiency, with the lead indicator “resource productivity”, as it provides a way to measure progress towards the goals of a green economy, as the outcome of sustainable economic development.

This way, we emphasize the main principles and features of decoupling the sustainable production from resource use. This is also a necessary condition for the path of green economic growth.

In this context, the paper presents an analysis of the evolution of the resource decoupling in Romania, in order to put into evidence the fact that it was possible only due to the economic crisis of 2008-2010. The rate of growth of the resource productivity (RP) is compared to the economic growth rate (of the GDP) to highlight the main recent issues and trends in Romania and in the EU.

## MATERIALS AND METHODS

The methodology used below is based on:

- Clarification and definition of the main methodological and operational concepts;
- Description of economic correlations in the decoupling mechanisms by increasing resource productivity;
- Analysis and synthesis of the characteristics and mechanisms for decoupling economic growth from resource use, both for the aggregate indicators as well as those per capita;
- Analysis and synthesis of the strategic objectives for a sustainable and resource-efficient production and economic development in Romania;
- Adjacent calculations, with tables and graphics, for a dynamic comparative analysis of the trends of main indicators.

## RESULTS AND DISCUSSIONS

### Theoretical and methodological background

As we have pointed out in a previous paper, all stages of the resources' life cycle – extracting natural resources, transforming them into goods, and subsequent processes of recycling and disposal – put pressure on the environment. Yet this systemic relationship is the very essence of the continuous economic process of production and consumption [6].

Consequently, the new paradigms of production and consumption call more and more for a higher resource-efficiency, a concept that underpins all the valuable ideal concepts of economy and development: sustainable development, the green economy and the circular economy, as well as the strategies dedicated to their objectives [7].

Deeper studies and easily understandable indicators have become necessary to provide signals and measure progress in improving resource efficiency and show how society is doing in decoupling economic development from the use of natural resources.

At present, the issue of resource efficiency expressed by the resource productivity (RP) indicator has a clear environmental dimension, so it is considered an appropriate lead indicator of sustainable development.

Resource productivity describes the relation between economic outputs in monetary terms ( $Y$  – numerator) and a physical indicator ( $M$  or  $R$  – denominator) for the material or the resource input.

A particular resource efficiency aspect that we have raised in research is linked to the critical importance and role of the efficiency in the water production and use for a sustainable economic development.

It has been thus demonstrated that for the agriculture [5] as well as for all the industries and ultimately for our survival, water is one of the most important and scarce environmental resources, with some particular characteristics that raise serious challenges for a sustainable management and development [4].

There are numerous and sensitive socio-economic problems of sustainable water management, such as the issues on the role of efficient water pricing for sustainable water management. Our research showed that from the viewpoint of ecological sustainability, an efficient pricing of water supply and sanitation services can contribute to ecological efficiency if used in order to [3]:

- manage demand so as to encourage a more reasonable and efficient use of the resource;
- recover the costs of the damages borne by the environment (i.e. the negative impacts on ecosystems, including pollution).

But water is not the only priceless natural resource that we rely on for a sustainable socio-economic development. In the sustainable development framework, the total resource consumption (material flows, energy and land) is an appropriate description of the long-term environmental disturbance potentials and its reduction turns out to lead reliably to a de-escalation of most environmental problems, although not proportionally. Thus, the total natural resource consumption can be understood as an indicator for the environmental dimension of sustainable economic development.

By modelling sustainable development, the postulate shows that economic growth can only be environmentally sustainable if it is accompanied by resource productivity increases at a higher rate than the growth rate [8]. This relative limit to growth would lead to

an absolute reduction in resource use and thus in environmental pressures. Hence, there may be de-link between material use and economic growth called the decoupling effect.

The decoupling is actually a dematerialization of economic development, defined as the relative or absolute reduction in the quantity of materials required to serve economic growth [10]. The concept of resource decoupling has therefore become more and more important since by significance of raising resource productivity, it seeks to alleviate the problem of scarcity and respond to the sustainability challenge of intergenerational equity by reducing the rate of resource depletion and production costs.

Besides that, the decoupling may be expected to simultaneously reduce the environmental impacts of certain resources [6]. The impact decoupling requires increasing economic output while reducing negative environmental impacts. Those impacts arise from the extraction of required resources (such as groundwater pollution due to mining or agriculture), from production (such as land degradation, wastes and emissions). Methodologically, the impacts can be estimated by life cycle analysis (LCA) in combination with various input-output techniques.

For highlighting the effect of resource decoupling, when analysing trends in resource productivity, the focus is put on the relationship between the trends in GDP and material consumption. These are called 'decoupling' indicators because they show the strength of the link between the economic and the environmental variable.

Consequently, in relation to sustainable development, the aim is to achieve 'decoupling' of these two variables, so that continued economic growth does not lead to a further increase in environmental degradation. A recent study assumes that an improved evaluation of decoupling could be performed once the aggregate production (GDP) is transformed to the "*per capita*" level (per capita GDP) and compared to the material consumption per capita (DMC per capita) [11]. The per capita GDP is used as valid indicator for comparing and ranking national

and regional economies, while environmental indicators based on the per capita GDP have prevailed in studies of the so-called Environmental Kuznets Curves [13].

Assuming this point, we shall further employ, in our own analysis of the trends in resource productivity and decoupling resource use from economic growth in Romania besides the aggregated indicators of RP and GDP also some per capita indicators such as: the Domestic Material Consumption per capita (DMC/capita) and the Gross Domestic Product/capita (GDP/capita), to check whether this approach may lead to different insights and conclusions.

An actual decoupling and dematerialization of economic growth should occur when the rate of economic growth (GDP/capita) exceeds the rate of material consumption per capita (DMC/capita).

#### **Objectives and issues of resource decoupling for sustainable production and consumption**

In Europe, an important step in the efforts of decoupling resource use and its environmental impacts from economic growth was the adoption of the EU's Thematic Strategy on the Sustainable Use of Natural Resources under the 6th Environmental Action Program. This strategy has the objective of achieving a more sustainable use of natural resources by reducing the negative environmental impacts generated by the use of natural resources while ensuring economic growth. The Strategy recognizes decoupling of both resource use and its impacts from economic growth. The Renewed European Union Sustainable Development Strategy [2] and the National Sustainable Development Strategy (NSDS) of Romania [14] have set the objective of promoting sustainable consumption and production patterns.

European economic policies put increasing focus on the goal of 'dematerialising' economic output, i.e. reducing the quantity of resources used by the economy [1]. In this respect, decoupling growth from resource use, increasing the resource-efficiency and unlocking new sources of growth are objectives which need integration in the policies shaping economy and lifestyles.

In the National Sustainable Development Strategy of Romania (NSDS) 2013-2020-2030 it was stated as an important horizon 2013 national objective: to achieve eco-efficient management of resource consumption and to maximize resource productivity by promoting a pattern of consumption and production that: makes sustainable economic growth possible; brings Romania gradually closer to the average performance of the other EU countries.

The importance of this national sustainable development objective is emphasized by knowing that, as previously pointed by [12] the Romanian economy's resource productivity was at the lowest level in EU-27 in the period 2000-2007, far below the EU-27 average.

This was due to the fact that in Romania, the business focus was not resource efficiency or sustainability concerns, but the relatively low level of labour productivity and benefiting from the predominance of labour-intensive industrial sectors, with competitive advantages based on the second lowest labour costs in EU-27.

By applying the specific theoretical-methodological relations with own computations of the main indicators (GDP, Resource productivity-further here referred to as RP), we may analyse whether in the last years (2000-2012) the sustainable economic growth and resource-efficiency criteria have been met in economic development.

As we highlighted in previous papers, the average level of resource productivity (RP expressed in PPS/kg) in the EU-27 has grown quite significantly (60%) in 2013 as compared with 2000.

On the contrary, in Romania, the RP expressed in PPS/kg in 2013 was 4.6% lower than in 2000, and this was quite a recovery after the drop of 28% in the RP level of 2008. So the gap towards the EU-27 average level of resource productivity has widened in recent years, since in 2000 RP in Romania was of 52.4% of the average RP in EU-27 while in 2013 it represented only 31.1% of the average RP in EU-27, in PPS/kg.

As evident from Table 1 and Figure 1, in Romania, the Domestic Material

Consumption per capita (a proxy for the resource use/capita) has increased with more than 160% in the period 2000-2012, on a significant upward trend.

Table 1. Evolution and trends of the GDP/capita rate (%) and DMC/capita (t/capita) in Romania 2000-2012

|                       | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----------------------|------|------|------|------|------|------|------|
| DMC/capita (t/capita) | 7.6  | 12.2 | 12,0 | 13,1 | 14,1 | 15,4 | 16.7 |
| GDP/capita rate (%)   | 2.5  | 5.7  | 8.7  | 6.0  | 9.0  | 4.8  | 8.7  |
|                       | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| DMC/capita (t/capita) | 19.9 | 25.6 | 20.1 | 18.6 | 21.0 | 20.5 | n/a  |
| GDP/capita rate (%)   | 8.5  | 10.3 | 6.3  | 0.2  | 1.6  | 1.1  | 3.8* |

Source: Own computation based on data from NIS, System of SDI, OP4\_2 Domestic Material Consumption per Capita

The trend of poor resource efficiency, no decoupling and unsustainable economic growth in Romania is also confirmed by our analysis based on data from the National System of Sustainable Development Indicators of the Romanian National Institute of Statistics (in table 1, figures 1 and 2).

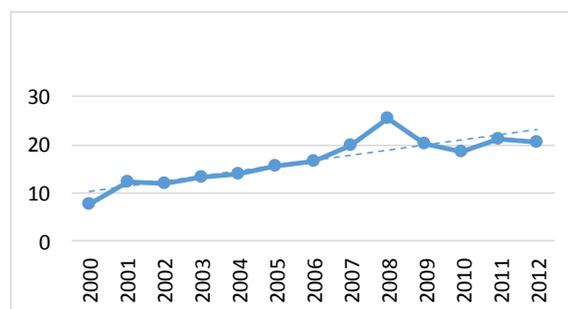


Fig. 1. Domestic Material Consumption per Capita evolution and trend in Romania, 2000-2012 (t/capita) Source: Own computation

This trend is not that of a sustainable and resource-efficient production and consumption in Romania since there was practically no significant decoupling of economic growth from resource use, for more than a decade.

The only years when the GDP/capita rate exceeded that of DMC/capita are 2002 and then 2009 and 2010, during and due to the economic recession.

To highlight this statement, considering the methodological insight of a per capita approach in sustainable development, resource productivity and decoupling analysis

(as cited in section 1) we have represented in Figure 2 that for the same period 2000-2012, the fact that GDP/capita rate (as a proxy for the rate of economic growth in Romania) has the similar trend with the DMC/capita rate (a proxy for the rate of resource use).

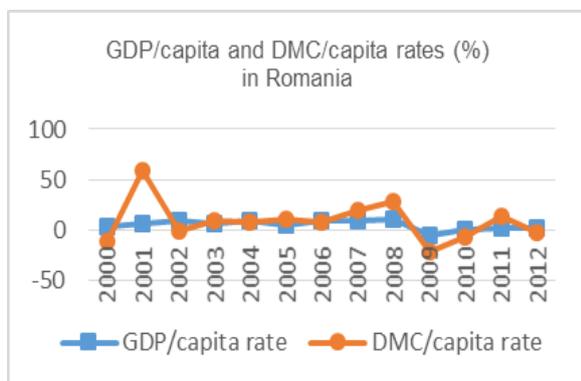


Fig. 2. GDP/capita and DMC/capita rates (%) in Romania, 2000-2012 Source: Own computation

Nevertheless, we would also like to check for decoupling and sustainability by applying the first theoretical-methodological criterion as presented in section 1, namely the environment-economy interlinkage in the sustainable economic development approach [8], and see whether we come to similar outcomes and conclusions.

Indeed, as observable in Figures 3a and 3b, (according to our calculations based on data available from Eurostat) by applying the criterion of sustainability in the model of the absolute decoupling of economic growth from the resource use, this was not achieved along the entire analysed period 2000-2013, not only in Romania, but neither in the EU-27. Hence the GDP rate in Romania was in most years of the period higher than the RP rate (mainly negative or 0).

We noted however something more here, when considering the period 2008-2012: in Romania (Figure 3 a), the sustainable growth condition  $d(GDP) < d(RP)$  has not been indeed fulfilled except for the year 2002 and for during the economic crisis of 2008-2010 (outcomes consistent with those of the per capita dynamics analysed previously, in figure 2). The trend means that in this period of economic recession, the production of energy-intensive and material-intensive sectors has mostly decreased, and a more sustainable

production structure and path was possible.

The same trend is more striking and more significant actually, across the EU-27 (Figure 3 b) where the sustainable growth condition  $d(GDP) < d(RP)$  has been indeed fulfilled during the economic crisis of 2008-2010 up to 2012 as well.

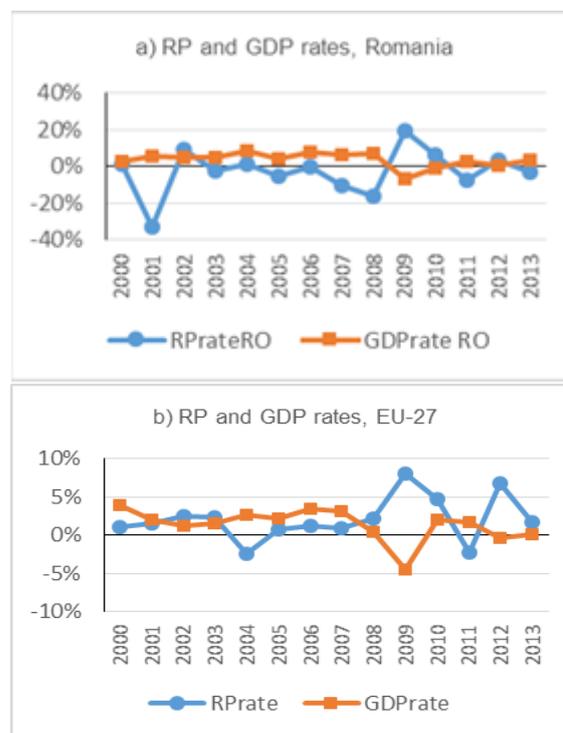


Fig. 3. RP and GDP rates in Romania (a) and in the EU (b) Source: Own computation

In our view, this result means that there was also a positive effect of the economic crisis, in the rehabilitation of economic structure or a smart recovery which may, if maintained and exploited in the future, promote a model sustainable development through an absolute decoupling of economic growth from resource consumption in the European Union.

## CONCLUSIONS

The concept of resource decoupling, associated with the objectives of increasing resource productivity, is most important in the current EU efforts for increasing resource-efficiency and the dematerialization of economic development.

Resource decoupling means reducing the rate of use of (primary) resources per unit of economic activity, so it leads to an increase in the efficiency with which resources are used.

Such enhanced resource efficiency (productivity) can be expressed for a national economy, an economic sector or a certain economic process or production chain, by dividing added value by resource use (e.g. GDP/ Domestic Material Consumption). If this quotient increases with time, resource productivity (RP) is rising.

The main conclusion in a previous study [7] was that, in Romania, the situation of the resource productivity indicator is complicated since here we must reverse the 2000-2012 downward trend of the RP. A continuation of this trend in Romania may threaten the sustainability of economic growth in the long term, due to excessive and irrational resource consumption, with negative consequences for the state of our natural capital.

As stated in [1], to assess the sustainability of European systems of production and consumption, it is necessary to move beyond measuring whether production is increasing faster than resource use. Rather, there is a need to assess whether there is evidence of 'absolute decoupling', with production increasing while resource use declines. Therefore, as a contribution of the paper to this assessment, by applying the graphic method on two different sets of indicators (of resource decoupling) for a comparative analysis in data dynamics, we get to similar outcomes leading to a sole final conclusion: the absolute decoupling of economic growth from the resource use was not achieved in the analysed period 2000-2013 in Romania except for the period starting with the economic crisis of 2008-2010, which may mean that in this period the production of energy-intensive and material-intensive sectors has mostly decreased, allowing the resource decoupling. To enable some prospects and policy recommendations, future research will analyse more deeply the evolution and the factors resource decoupling in Romania.

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