

THEORETICAL ASPECTS ON THE EFFECTIVENESS OF ENVIRONMENTAL EXPENDITURES

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Abstract

Air and water quality are vital for human life and our societies devote large sums of money to reduce pollution and conserve a healthy environment. Much of the financial resources mobilized to finance environmental protection come from private sources - entrepreneurs pay to eliminate environmentally harmful waste safely, or to mitigate the effects of polluting production processes.

But while technology standards, environmental permits, pollution taxes play an important role in correcting the behavior of society, public expenditure presents also a very important variable in efforts to support the environment.

Key words: *environmental expenditure, financial flows, efficiency, effectiveness, economicity, environmental funds, financial support for environmental protection expenditure*

1. Introduction

Environmental expenditures reflect financial flows allocated to an operator (public administration, businesses, individual household) for actions aimed at preventing, reducing or combat environmental damage. Environmental costs can be defined as the funds invested in all activities and actions to prevent, reduce and eliminate pollution and other environmental damage resulting from production processes or consumption of goods and services. [1]

An important distinction to be specified is a link to the notion of environmental expenditure and the expenditure related to the environment protection. If the first category are embedded all activities funded to prevent, reduce and eliminate pollution or other environmental damage, the second concerns the expenditure claimed by the company on activities directly aimed at protecting and improving the environment and is excluded from this category all expenses that the company is bound by the rules.

Total expenditures for environmental protection at the national level include: investment, internal current expenditure (expenditure implemented by unit staff, excluding external current expenditures (expenditures for the purchase of services from third parties, environmental protection and environmental taxes paid as) . Therefore, related ob the methodology of National Institute of Statistics, total expenditure for environmental protection at national level is calculated by adding the following categories of expenses:

$$CTPM = IT + CCIT$$

Total Investment:

$$IA + IB + IT = IC$$

where:

IA - investments by non-specialist manufacturers of industrial activities

IB - investments made by specialized producers

IC - investment by local government

Current expenditure for environmental protection:

$$CCIT = CCIA + + CCIC CCIB$$

where:

CCIA - internal current expenses incurred by non-specialist manufacturers

CCIB - internal current expenditure made by specialized producers

CCIC - internal current expenses incurred by local government

2. Source of financing environmental protection expenditure

Governments support the financing of certain activities to provide environmental public goods, such as, for example, basic sanitation levels necessary to protect health.

Public funds are also used to make loans easier accessibility to financial markets for environmental projects through measures such as risk sharing, improved credit conditions, or which may arise through subsidies to reduce costs loan for communities that can not afford the total cost of investment. Ensuring that public spending programs are well managed is an essential element that ensures effective and efficient implementation of environmental policies. Public expenditure on environmental protection should be assessed from two perspectives: the essence of advanced environmental policies and sustainable public finances. In terms of environmental policy, the main challenge is to ensure that public expenditures achieve the desired result with the lowest costs, and that they are part of a coherent strategy for achieving environmental objectives. From the perspective of public finance, public spending should be managed in accordance with standards established by political factors. When selected for funding environmental programs, governments must ensure that social benefits expected from any social program costs exceed expected costs. If the benefits are difficult to measure, instead governments can test how an environmental program achieved its objectives.

A key question is whether public expenditure management mobilized revenues from environmental taxes should be allocated to fund specific environmental services. Such allocations are a popular practice for environmental authorities. This practice ensures predictability of funding environmental projects and is popular in political terms that clearly affect the income to obtain a social benefit, which helps to make new taxes more acceptable. But the allocation of funds also limits the flexibility of public spending and may mean that resources are not allocated efficiently. This may also lead to the marginalization of environmental issues. Under certain conditions, however, the allocation is seen as a price worth paying to finance priority environmental measures. In such cases, the allocation of funds should not go beyond the time necessary to achieve the stated objectives.

Once the revenue has been collected, governments need a structure for distribution to environmental projects. Special funds are a popular medium for channeling public expenditure for the environment, but the way it works varies greatly from country to country.

In countries where such funds exist, they tend to focus on one segment of environment - such as water treatment, air or waste. This allows a more efficient management, it is easier to define specific targets and to monitor results than if the funds were allocated to the environment in general.

In Austria, for example, the government operates three funds to support environmental investments: a Fund to manage water resources, an environmental fund and a fund for the rehabilitation of contaminated sites. Together, they distribute nearly 300 million each year as investment support.

Similarly, in France, six regional public water agencies are responsible for the collection and expenditure of public investment in the water sector. They have a high degree of autonomy and, on average, it's a total budget of more than two billion euros per year.

In the Czech Republic, Hungary, Poland, Slovakia, environmental funds have a wider field of action, and most of them are used to manage revenues from structural and cohesion funds of the European Union, and to ensure co – financing the investment supported by these funds. Funds from these countries are legal persons with well-established management structure.

Beyond public funding schemes, user charges are the only long-term sustainable options for financing environmental investments. User charges in France and Germany were raised to cost recovery levels and currently generates enough income to cover at least operating costs and maintenance of water utilities, but also, as far as possible, new investments in water supply and sewerage infrastructure.

The above experiments indicate that there is room to improve the performance of public environmental expenditure programs. In particular, in countries in transition and developing countries certain practices could borrow from the European Union to design and manage these programs so as to contribute to the efficient and effective implementation of environmental policies.

The Public Expenditure Management Handbook developed by the World Bank (1998), supported the objectives of the proper management of environmental expenditures in general such:

- fiscal discipline: maintaining sustainable fiscal prudence;
- efficient resource allocation: strategic facilitation of total spending priorities in the policies, programs and projects to promote efficiency and equity;
- cost-effectiveness: encouraging better use of resources to achieve desired results and to produce results at the lowest cost possible.

Information on environmental protection-makers can help to track and monitor the effectiveness of environmental policies undertaken specific application of the 'polluter pays' and ensure the ownership costs of compliance with environmental regulations.

More specifically, the information submitted specificity and quantitative amount of environmental costs can be used for a variety of purposes:

- to analyze the economic impact of environmental policy - for example, possible effects on the competitiveness of enterprises;

- to consider the need for financing environment and to track and monitor your specific investment programs;
- to show, for example, in environmental performance reviews that action measures have been taken to reduce pressure on the environment, to serve as an indicator of response from society to reduce pressure on the environment in general and the an indicator of sustainable development in particular;
- to serve as an internal tool to help companies identify and minimize the costs of environmental externalities and inform external stakeholders (stakeholders) on actions taken, and as a hub for financial analysts in their assessments of business;
- as a basis for the description of environmental goods and services market.

At the same time, stimulating environment also ensures the opportunity of creating new markets for goods and services to prevent or treat damage to the environment, stimulating the development of a greener economy. Environmental expenditure can be defined as the funds invested in all activities and actions to prevent, reduce and eliminate pollution and other environmental damage resulting from production processes or consumption of goods and services. The implementation of environmental policy objectives has seen an upward trend in recent years. Increased attention to environmental problems facing humanity requires effective policy development and corroboration both nationally and internationally. A fundamental reason to justify the need for policy intervention in environmental issues is given by the nature of externalities involved.

Without government intervention, consumers and firms generally do not consider the real costs to the environment posed by their economic behavior.

Government intervention in environmental policy should be to develop and implement a set of regulations to correct the behavior of producers and consumers, or using a system of environmental taxes and subsidies. Environmental expenditures are considered to be one of the representative indicators of economic development. A key feature characterizing the economic and financial environment costs considered more important than their nominal value refers to the effectiveness of these expenditures - results in exchange for monetary resources consumed.

3. Effectiveness of environmental expenditures

One of the biggest problems of contemporary economic theory is to define and measure the effectiveness, or in other words, use of resources and transforming them into outputs and outcomes. Since 1957 Farell has questioned how to measure the effectiveness and stressed their importance for economic policy makers, "it is important to know to what extent a particular industry may simply increase production efficiency without absorption of additional resources." [2]

Over several decades assessment of procedures used to measure efficiency and its much improved. However, it is still a conceptual challenge in relation to public expenditure.

The problem of evaluating the effectiveness of public spending is complicated by the fact that the results of the public sector are often outside the market, lack of relevant data and thus can not be quantified, as stated by a group of authors from the European Commission. [3] They analyze the efficiency of public spending by defining the conceptual framework on the inputs, outputs and results, highlighting the difference in understanding the concepts of production and result.

To evaluate the efficiency of public expenditure (including those relating to environmental protection), most authors use the methodology 3E - economy, efficiency and effectiveness.

Efficiency is given by the ratio between effects and efforts made appropriate (financial), or a particular allocation of public expenditure which acquires the highest possible amount compared to the amount of resources spent in order to meet them.

Effectiveness is given by the ratio between the effects obtained and provided to achieve, ie a certain use of public spending, which leads to obtain the greatest possible effect, observing the desired result, which is a prerequisite for achieving optimal pre-determined objectives . In other words, efficiency means how goods and services produced / provided fulfill their usefulness.

The economy means a use of public spending conducive to achieving the desired objectives with the least amount of resources spent and while maintaining the quality of duties. Simplistically speaking, the economy compares the balance between efficacy and degree of achievement of the results set. [4]

Table no. 1

Criteria for evaluation of expenditure

Criterion	Monitoring tools	Expected benefits
Economicity	Minimizing the cost	Ideally, the lowest price
Efficiency	The cost per unit of output	Lowest cost per unit of output
Effectiveness	Fulfillment rate	The highest rate of objectives achieved at considerable cost

Source: adapted after K. Ararossis, C.A. Brebbia, *Environmental Economics and Investment Assessment*, pag 110

However, compared with the measurement of productivity, efficiency concept includes the idea of the production possibilities frontier, indicating possible levels of output, especially if we consider the magnitude of various operations. The higher the value of the variable "output" to a given level of the variable "input" or lower the value of the

variable "input" to a given level of the variable "outputs", the more efficient the activity in question. Productivity, by comparison, is simply the ratio of outputs produced using inputs.

Efficacy link inflows and outflows of endpoints to be made, ie the result. The result is often linked to welfare and growth objectives and, therefore, can be influenced by multiple factors (including outputs, and internal environment of exogenous factors). Effectiveness is more difficult to assess than the efficiency, because the result is mostly influenced by the choices and elections makers.

When measuring the effectiveness of a distinction can be made between technical efficiency and allocation efficiency. Technical efficiency reflects the relationship between inputs and outputs, taking into account the production possibilities frontier. Gains arising from technical efficiency are moving towards this production possibilities frontier ("best practices"). However, not every form of technical efficiency is economically profitable and this is captured by the efficient allocation of resources, which introduces the notions of costs and benefits. Efficient allocation of resources reflects the relationship between an optimal combination of inputs, taking into account the costs and benefits and results.

In addition to these three classical concepts sometimes used the term quality. Quality means such use of public expenditures that provide optimal rate of achievement of objectives.

When considering the effectiveness of the methodology is based on multiple criteria evaluation of efficiency based on the three pillars of sustainable development: social, economic and environmental.

As is the social aspect (social pillar) of the evaluation, the focus in evaluating environmental expenditures is the social aspect existing in expenses taken into account. The indicator used to assess the effectiveness of environmental expenditure seen in socially way (Ks) could be constructed as follows: [5]

$$K_S = \sum_{i=1}^n w_i k_{Si}$$

where:

wi - size criterion

KSI - social efficiency criterion (in percent)

n - number of criteria

The interval can range indicator is closed interval [0,1] $0 \leq KS \leq 1$

If KS = 0 then the costs are totally ineffective.

For example, if the costs of municipal waste management, appropriate criteria for evaluating the effectiveness of social spending could be indicated as follows:

KS1 - Willingness to sort municipal waste (in percent)

KS2 - Employment - Impact on employment (date of service is organized by local authorities or companies that have that type of activity (in percent)

KS3 - The living conditions of citizens - have a positive impact on costs with improved living standards of the citizens of a municipality (in percent)

Economic aspects of evaluating the effectiveness of environmental expenditures come from efficiency concept explained above and should include economic evaluation of efficiency and economy EKE, economic efficiency and economy quality EKQ, EKEf follows: [6]

$$KE = EKE + EKEf + EKQ$$

The environmental aspects of assessing the effectiveness of public expenditure arising from sustainable development indicators in specific areas of environmental protection. Complex efficiency evaluation criterion can be constructed in terms of environmental issues, as follows:[7]

$$K_{En} = \sum_{i=1}^n w_i k_{Eni}$$

where:

KEni - criteria related to environmental efficiency

n - number of criteria

wi - size and standardized criteria

The essential condition is $K_{En} \geq 0$, and if $K_{En} = 0$ then the costs are totally ineffective.

4. Evaluation of economicity and efficiency of environmental expenditures

The methods most commonly used to assess the effectiveness of public investment (and current) are:

- the cost – minimization;
- the cost – effectiveness;
- the cost – utility;
- cost - benefit analysis.

The specifics of these methods is suitable for evaluating the effectiveness of expenditures for environmental protection. The only exception is the cost - minimization using only the value that compares the costs (expenses) in certain investment projects.

In addition to these methods of assessing public spending in the literature are specified and other methods can become a focal point in initiating analysis on the effectiveness of environmental expenditures. These methods are shown in the table below:

Table no. 2

Possible methods for analyzing the effectiveness of environmental expenditures

	Categorii de metode	Exemplu de metode
The number of evaluation criteria	Methods that use a single criterion	Cost - result methods (the cost - minimization, cost - effectiveness, cost - utility cost - benefit analysis)
	Methods that use several criteria	Methods that use weights
Type of evaluation criteria	Nonmonetary	Methods that use the usefulness criterion
	Monetary	The present value, net present value, return on investment, etc.

Sursa: adapted after A. Boardman, *Cost-Benefit Analysis: Concepts and Practice*. Upper Saddle River, NJ: Prentice-Hall, Inc. 1996, pag. 12

Assessing the effectiveness of public spending, however, faces several limitations. This occurs because current expenditures usually consist of expenditure for public services - services of common interest. This makes it difficult to assess the effectiveness of expenses using cost - benefit analysis or cost - utility.

If cost - benefit analysis is difficult to estimate the benefit of these services in monetary terms and in terms of the cost - benefit situation is even more complicated because there is no appropriate methodology for environmental costs.

The purpose of cost-benefit analysis is to assist in taking decisions to facilitate social and more efficient allocation of resources. Since resources are limited, while the necessary resources shows a tendency of growth, it is necessary to set priorities. Priorities are ranked by net benefits.

Cost - benefit analysis has the advantage of balancing the beneficial aspects of a policy or project against actual volume of resources that society must give up the implementation of the policy or project.

This method of assessing the efficiency of public spending scenarios involves setting the desired changes, setting basic standards against which changes made to evaluate, estimate (predict) the physical effects, assessing its effects (to benefit) and estimate costs of achieving the desired changes. Boardman identifies nine steps in cost-benefit analysis. Even if only one (step 5) refers directly to the assessment, understanding and consideration of the nine essential steps to avoid errors of assessment.

The nine steps of the cost - benefit analysis are: [8]

1. Decide benefits and costs that matters
2. Select the portfolio of alternative projects
3. Catalog potential impacts and select measurement indicators
4. Anticipate the quantitative impact on the life of the project
5. Monetary quantification of all effects
6. Reduction of time to find the actual values
7. Summing real value adding benefits and costs
8. Perform sensitivity analysis
9. Recommendation alternative with the greatest net benefit social

Cost - minimization is a technique that can be applied where we have approximately the same result in all cases (scenarios) evaluated alternatives that we consider, or where all the alternatives considered future minimum standards produce results close required.

Cost - effectiveness is generally described as an alternative to cost - benefit analysis in situations where the outcome of a project (or an alternative available) can not be quantified in monetary terms, but is expressed in "common physical units that measure the effect". [9]

The specificity of this method is that it can compare relevant alternatives and determine if there are less expensive and more effective to achieve objectives. Cost - effectiveness involves the following steps:

1. Identifying all the effects of the acting;
2. Their assessment is quantified in terms of costs or the effects;
3. Determination of cost - effectiveness for each alternative in part by the formula:
$$C / E = \text{Cost} / \text{Effects}$$
4. Identify the best alternative available taking into account the cost / effectiveness;
5. Comparison of availability earnings makers to pay;
6. Accepting or not depending on the results of the alternative previous step.

Cost - utility is a technique whose features are similar to those of cost - effectiveness, the difference being that in the case of cost - utility, the result is defined differently, using a single unit instead of a result, a combination the results

referred effects. This variant is used, especially in the economic theory of health services, the result or benefit is measured in terms of "years of life improve quality" or other non-monetary measure signifies a value in terms of patient welfare.

The limited public financial resources make the problem use will be crucial. Public expenditure involves limiting area market action and substituting non-market methods of allocation. There is, therefore, approaches the efficiency of economic activity reveals division between the sphere of the free market and that of the state.

To ensure an optimum between necessary financial resources to finance environmental protection and the limited financial resources, the need for a clear delineation of specific institutional commitments to environmental public expenditure management.

Environmental departments at various levels of government can choose from a variety of institutional arrangements to implement any environmental expenditure program. Both public and private agencies can be contracted to perform this task. Selection institutional arrangements should however be adapted to the specific needs of a given program costs. Based on these needs, you can select one or a combination of several options listed below: [10]

- government departments directly responsible for purchasing goods and environmental services or funding specific projects budgeted;

- project implementation units within a government department established in order to implement a specific program of public spending in the budget;

- autonomous governmental units / decentralized financed from the state budget and created in order to separate a services providing environmental services or undertaking certain administrative tasks of policy formulation;

- special purpose tax units (eg river and basin water agency, forestry agencies, etc.); public utilities, which have the authority to impose user charges and the responsibility to develop, maintain and ensure the functioning of collective infrastructure (eg water municipal solid waste);

- budgetary funds of its own, autonomous management structure, financed by the state budget allocations. Such funds may be established within the government at sector or region, and sometimes co-financed by transfers from the state budget;

- budgetary funds managed outside the government financed from own revenues. Such funds may have independent legal status, although revenue and expenditure plans are approved annual budget law;

- extrabudgetary funds, managed outside the government, financed from its own revenues. These funds have always independent legal status and are very active in financing acțiunilo and environmental projects. Income and spending programs do not require approval of the annual budget laws, although their budgets can be added as an annex to the general budget;

- spending programs funded independent intermediate units of government. The intermediary has a contractual obligation to pay government resources in terms and conditions specified in the agreement with the government. Such spending programs are funded usually by budget transfers discrete, but can also be contracted by special purpose tax units, autonomous agencies or autonomous funds. A governmental entity subordinate (eg, bank, fund or agency) may be contracted to pay grants or soft loans. A private sector entity (eg, bank, leasing company or investment fund) can also be contracted to provide services in relation to the implementation of government spending programs. The range of services offered by the private sector can be very broad, extending from the elements of evaluation of projects selected for full financial intermediation loans and grant funding type (with or without co-financing), or concession for the project;

- owned by funds designed to manage spending programs co-financed by foreign loans or grants. The legal status may take the form of a trust fund, foundation, association or commercial company. These funds are usually, additional funding from the general budget or from specific sources of domestic revenues. Foreign funding usually requires a significant degree of managerial autonomy and political isolation of segment;

- directed credit funds (funds Directed credits - DCF) established as financial intermediaries, either government or donor organizations of international financial institutions like the World Bank. They are designed to finance small commercial and municipal projects to reduce pollution by avoiding direct financing costs.

5. Conclusion

Regarding of the efficiency of environmental funds, we can appreciate that they must meet the following characteristics:

- to prevent or reduce long term economic inefficiencies inherent in the allocation of funds, expenditures should be targeted to meet environmental priorities and promote projects with high environmental benefits relative to their costs;

- environmental funds should play a catalytic role in financing projects and environmental actions, ideally providing financial support for the project limits;

- environmental funds should be used in combination with other environmental policy instruments such as regulations or administrative direct economic instruments;

- environmental Funds should develop an overall strategy for financing the agreed targets, followed by clear and explicit operating procedures for evaluating and selecting projects, to adopt an effective monitoring and evaluation practices for selected projects viable and efficient internal and external expertise to enhance administrative efficiency;

- investment projects, environmental funds should be well designed programs to ensure effective use of financial resources;
- environmental funds should not compete with emerging financial markets, but should attract financial resources from private sector enterprises, municipalities and financial institutions for environmental investments;
- in the design and evaluation mechanisms to mobilize revenues available to fund environmental, environmental authorities should ensure environmental effectiveness, economic efficiency and administrative fairness and acceptability them;
- environmental funds should ensure transparency in the mobilization of financial resources and their distribution, ie to specify clearly the sources of income and expense.

Regarding the efficiency of public spending for environmental protection we can appreciate that there are a number of conditions related to institutional development, the quality of the tax system and the degree of maturity of the market. To ensure effective implementation of public expenditure programs for environmental protection is impetuous necessary to achieve the following sequence:

- defining priority environmental objectives;
- determining the need to use public funds financial resources to achieve defined objectives. If not justify the use of public funds to achieve those objectives to achieve operating a variant of the preceding assumptions tradable emission permits is the use or environmental taxes;
- establish sources of revenue mobilization, quantification in monetary terms defined objectives and defining expenditure program (a program of expenditure must capture information on estimated costs, description of projects eligible for funding and typology of beneficiaries, financing conditions procedures, principles and criteria for project evaluation and selection, performance indicators, etc.);
- exercise control procedures on public institutions implementing the program expenditures for environmental protection (in case of our country by the Ministry of Environment and Climate Change Environment Fund Administration).

Exercise of the control function will ensure the achievement of a desired level of performance, both in terms of targets achieved and in terms of efficiency, effectiveness and timeliness of financial resources mobilized and spent.

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