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# Efficiency of LEADER Programmes in the creation of tangible and intangible outputs: a Data Envelopment Analysis application to Local Action Groups performances

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*Abstract*

*An emerging requirement for the evaluation of the rural development policy is the adoption of an objective method accounting for both material and immaterial achievements, and measuring the performance in order to understand the degree of accomplishment of policy objectives. In this paper we propose a Data Envelopment Analysis (DEA) approach capable of dealing with economic and social indicators, to measure the (relative) technical efficiency of a set of Local Action Groups (LAGs) operating within the LEADER programme. An evaluation exercise referred to eight LAGs located in Italy, is provided to demonstrate the effects of the inclusion of social capital indicator in the evaluation of the LAGs' performances. In particular, the DEA allows to measure the relative efficiency of the LAGs and to identify the causes of the inefficiency. The outcomes of the analysis may represent a valuable information support for periodical policy review and for the enhancement of best practices.*

*Keywords: Rural Development, LEADER, social capital, DEA*

*JEL: Q18, R58*

## 1. INTRODUCTION

The idea underlying the endogenous rural development concept is that socio-economic well-being can be best achieved by focusing on local resource valorisation. According to this concept the rural development policy approach is based on the decentralization of responsibility for policy design and implementation to local communities. Under these conditions, on the one hand local communities are enabled to develop and implement policy measures suited to their specific needs and, therefore, the policy framework becomes very flexible. On the other hand, the funding authority (EU, member state, regional government) faces some difficulties in evaluating the performances of different local policies, due to their heterogeneity and the existence of a plenty of determinants affecting the development of rural areas. This implies the need for formalization of specific evaluation tools (Ray, 2006).

The increasing focus on the evaluation issue has stimulated the development of alternative theoretical frameworks (Jackson and Kassam, 1998; Midmore, 1998; Saraceno, 1999; Estrella, 2000; Ray, 2000; Wadsworth, 2001; Moseley, 2003) and appropriate tools (Gosling and Edwards 1995; European Commission, 2001; European Commission 2002; Moseley, 2003). The core of the debate within the LEADER programme is to find a suitable assessment methodology that in the view of the European Commission (European Commission, 2001) should account for the efficiency and effectiveness of the local development plans

implemented by each Local Action Group (LAG), including the analysis of all factors contributing to their success or failure (European Commission, 2001).

This paper stresses the fact that rural development policies represent is conceived as a sort of start-up to trigger peoples interaction and coordination. Consequently, major effects are expected in term of social capital increase, which should be considered as one of the most valuable outcomes of the policy, deserving to be included in the evaluation. This implies that the assessment process should account not only for physical and tangible outputs, but also for intangible and locally-rooted effects whose social capital aspects deriving from the quality of participative process, the confidence-building process and the identity raising of the local community, are especially stressed in the LEADER Initiative.

Due to the scarcity of methodological tools capable to account for these aspects, we propose a methodology to evaluate the efficiency of the policy, by comparing material and immaterial inputs and outputs. To this regard, we apply a Data Envelopment Analysis (DEA), which has already been used to efficiency evaluation of policy measures (Giannoccaro et al. 2010; Bono and Matranga 2005; Musolino and Rindone 2009).

This paper presents an evaluation exercise on eight LAGs located in Italy, in order to demonstrate the effects of the inclusion of social capital indicator in the evaluation of the LAGs' performances. In particular, the DEA allows to measure the relative efficiency of the LAGs and to identify the causes of the inefficiency. The outcomes of the efficiency evaluation may be a valuable information to support periodical policy review and to encourage the local actors in the adoption of the best practices.

The paper is structured as follows. In the next paragraph the state of the art and the relevance of social capital in the evaluation of LEADER programme is presented. It is emphasized the need to adequately measure either material or immaterial outcomes, in order to provide a comprehensive evaluation useful for government and local agents. In the third paragraph, the DEA approach is presented aimed at evaluating different LAGs performance. It is also shown how this methodology may be suitable to explain the causes of the inefficiency, and to get some suggestion for further improvements. The forth paragraphs illustrates an empirical exercise, referred to the analysis of the efficiency of eight LAGs located in Italy. The example allows demonstrating the powerfulness of the methodology in providing useful information to decision makers. The fifth paragraph concludes with some final remarks regarding the implications for policy assessment.

## 2. THE EVALUATION ISSUE OF RURAL DEVELOPMENT PROGRAMMES

### *2.1. The various functions of the evaluation*

In the context of rural development the evaluation process can assume several functions. This is particularly evident when the implementation of projects and programmes are carried out

through a multi-level governance based on what Ray calls the *neo-endogenous approach*[1] (Ray 2000). In this way, various kind of actors (beneficiaries and policy makers at local and supra-local level), who play a relevant role in the development process, express their own instances towards the evaluation process.

The funding authority (EU, regional governments) conceives the evaluation as 'a periodic assessment of the relevant performance, efficiency and impact of the project in the context of its stated objectives' (Casley and Kumar 1988, p. 12). Their need to *verify* the achievement of minimum economic standards and to *control* local actors engaged in the implementation of the local development plans. On the contrary, the local actors are interested in *highlighting the specific value of the work done*, and in *drawing lessons* from successful stories in the field of rural development[2].

As reported in Table 1, High and Nemes (2007) stress these different standpoints distinguishing between exogenous and endogenous evaluation. Two opposite logics emerge. On one hand there is public sector managerialism, which tends to formalize the control practice trough a rigid lists of quantitative indicators (Ray, 2006). On the other hand, the endogenous approach stresses the importance of learning from successful experience in which intangible and locally-rooted elements (such as awareness-raising, confidence-building and the participative society) play a determinant role. This is also stressed by the LEADER Initiative which has become a reference scheme for intervention in the rural development domain. The contrast between these two approaches has recently been included into the debate on the evaluation issue (Ray, 2000; High and Nemes, 2007).

Table 1. Exogenous and endogenous evaluation

| Kind of evaluation | Actors involved | Function |
|---|---|---|
| Exogenous | State/Supra-state centre administration | Control, improvement |
| Endogenous | Local authorities and beneficiaries | Learning process, added value evidence |

Source: adapted from High and Nemes (2007)

The first problem is to find appropriate indicators of the outcomes of the policy schemes, which should be chosen according to the nature and the main features of the rural development approach adopted. As stated by Farrel and Thirion (2005, p. 282) the LEADER's "main contribution is in the non-material domain, by helping to the renewal of social capital in rural areas". Therefore, the challenge of the evaluation process relies on the followings:

- how to produce performance indicators for the State/Supra-state centre administration, in order to exert *control* on the local authorities;
- how to contribute and stimulate the *learning* process of local authorities and beneficiaries through benchmarking on successful stories (i.e. learning and adopting best practices).

[1] It is defined as an 'endogenous-based development in which extra-local factors are recognised and regarded as essential but which retains a belief in the potential of local areas to shape their future' (Ray 2000, p. 4).

[2] Indeed, the evaluation can be seen as "an opportunity to foster social learning in rural development and to demonstrate integrity between the values of the Programme and the practices" (High, Nemes 2007, p. 111).

### *2.2. The state of the art of the evaluation practice*

Since the first edition of LEADER Initiative in the early nineties, the EU Commission provided criteria for the evaluation of local projects at national level. This criteria and the evaluation routines has been consolidated in the second edition of LEADER through a further standardization of the procedures. However, this conventional evaluation procedure tended to mainly focus on tangible output of the investments, while largely ignoring the intangible benefits related with the specific and locally-rooted added value provided by the programme (Midmore, 1998; Saraceno, 1999). However, the evidence for added value within LEADER programme, has been acknowledged by the recent evaluation guidelines (European Commission, 2002 and 2006) which also consider less tangible outcomes. Furthermore, recently in the academic domain, great emphasis has been given to the measurement of some intangible outputs of rural development programmes using the social capital theoretical framework (Svendsen and Sorensen, 2007; Magnani and Struffi, 2009). Although most of the literature is devoted to qualitative approaches (Dudwick et al., 2006), recently some quantitative methodologies have also been developed (Nardone et al., 2010; Sabatini, 2009). However, at present, the introduction of social capital indicators in the evaluation practice is still under development.

## 3. DATA AND METHODOLOGY

### *3.1. Methodological framework*

Provided that rural development policies are aimed at material and immaterial investments promoted in areas operating in very diversified conditions, we focus our attention on the efficiency of public funds, rather than on the cost-benefit assessment. The aim is twofold. In the one hand, there is a need to measure the performances of LAGs and management. On the other hand, it is necessary to identify successful strategies capable of enhancing the local development, through a benchmarking philosophy that seeks “best practices” from leading agency.

In order to achieve these objectives, we adopt a DEA approach which presents at least the following three advantages:

1) the possibility to consider several input and output that are heterogeneous, such as social capital, man-made capital, and natural resources, without the need to evaluate them in monetary terms. This feature is particularly suitable to compare the performances of LAGs operating with different resources endowment (e.g. labour force, infrastructure, human capital).;

2) the comparison among several local authorities allows to calculate the relative efficiency of public funds and, therefore, to identify the leaders and those lagging behind;

3) the method allows the identification of the causes of the inefficiency and, therefore, provides some information suitable to support local learning process.

A traditional DEA model requires two sets of variables, input and output referred to specific decision making units (DMUs) which, in our case, are represented by the LAGs. According to the background literature, we selected the following indicators:

*Input*

- Public funds: they are conceived as a trigger to activate the interaction of stakeholders and to enhance their entrepreneurship;
- Local resources endowment: they represent the assets of man-made capital, know-how competences and natural resources that could be devoted to production activities.

*Output*

- Social capital: it refers to the activation of interpersonal trust and the development of a common vision among the actors involved and operating in the same environment;
- Private investments: represent the response of the local area to the activation of the development process.

### *3.2. The DEA tool*

Data Envelopment Analysis (DEA) is a tool developed to evaluate the efficiency of a number of DMU. Differently from the typical statistical approach which evaluates the efficiency as a central-tendency approach, that is by comparing each unit with an average one, the DEA is an *extreme-point method* and compares each unit with only the 'best' one. This methodology is particularly useful whenever there is no criteria about the relative importance among outputs or inputs, as it does not require assumptions a priori (Callens and Tyteca, 1999). While the DEA is traditionally adopted to measure the efficiency of firms or industrial plants (Charnes et al., 1978; Coelli et al., 1998; Cooper et al., 2000; De Koeijer et al. 2002), as well as governmental departments and policy schemes (Bono and Matranga 2005; Glass et al. 2006; Giannoccaro et al. 2010), in the case of the present paper, the DMUs are represented by LAGs.

Although the efficiency relies on the ratio of output to input, in order to calculate the relative efficiency among a group of *n* units by considering *k* output and *m* input, a linear programming model is needed (Cooper et al. 2000). In the traditional DEA, the technical efficiency of the decision unit '0' ($h_0$) is given by the following model:

$$Max \quad h_0 = \frac{\sum_{r=1}^{k} \mu_r y_{r0}}{\sum_{i=1}^{m} v_i x_{i0}} \qquad [1]$$

$$s.t. \quad \frac{\sum_{r=1}^{k} \mu_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1 \quad , \quad j = 1,2,...,n$$

$$\mu_r, v_j \geq \epsilon \ , \ r = 1, 2 ,..., k \ ; \ i = 1, 2,..., m$$

$$\epsilon > 0 \quad (Non\ Archimedean)$$

The model allows the estimation of (positive) weights to be applied to outputs ($\mu_r$) and inputs ($v_i$), in order to find a ratio of output on inputs that is lower or equal to 1.

In addition, the post-optimal analysis of the linear programming model, provides several information related to the causes of the lack of efficiency, addressing to which output production should be enhanced or, conversely, which input is not adequately used. In other words, the post-optimal analysis provides the technical tool to perform the benchmarking of "best practices".

### *3.3. Data*

In order to show how the DEA can be applied to evaluate and compare the performance of various LAGs, we consider the case of eight groups operating in Italy in the edition of LEADER II and LEADER+. For each LAG, the data gathered are reported in Table 2.

Table 2. Resource endowment and performance

| LAG | Input1* Full-time jobs | Input2** Public Funds | Output1*** Social Capital | Output2** Private Investm. |
|---|---|---|---|---|
| LAG-01 | 4595 | 1,666,200 | 0.57 | 1,755,600 |
| LAG-02 | 9788 | 5,187,800 | 0.41 | 1,296,300 |
| LAG-03 | 10918 | 3,166,249 | 0.42 | 757,599 |
| LAG-04 | 9473 | 2,992,606 | 0.40 | 494,684 |
| LAG-05 | 9021 | 3,577,986 | 0.42 | 857,517 |
| LAG-06 | 8742 | 5,513,100 | 0.59 | 1,218,400 |
| LAG-07 | 9528 | 3,715,205 | 0.38 | 1,567,002 |
| LAG-08 | 4995 | 1,744,900 | 0.70 | 1,872,000 |

Source: *) Istat, 2009; **) local development plans of the LAGs and "execution annual report LEADER" published by the funding Authority; ***) our elaboration on Cimiotti, 2006 (for LAGs 01,02,06,08) our elaboration on Nardone et al. (2010) (for LAGs 03,04,05,07)

According to the methodological framework, the analysis of efficiency is based on two input and two output. The first input is the number of full-time jobs employed by the local firms, which is a proxy of the economic size of the local productive system. The second input used is the public funds spent by each LAG in their local development plans. It represents the exogenous resources provided by extra-local government to the local agencies. The first output is measures the social capital produced within each LAG, and refers to the relationships among the members of directorate. This output is a synthetic indicator of various social aspects affecting these relationships such as the heterogeneity of the group, the level of trust among the members, and the level of thought affinity (Nardone et al. 2010). The second output is the private funds activated by the local development plans. It is a proxy of the economic development effects.

Data are collected from several sources. The information concerning the local productive systems (number of full-time job) have been collected using official statistical sources (Istat, 2009). The financial data have been gathered by documental sources such as the local

development plans and the official reports on the advancement of the plans. Finally, the social capital measures are borrowed from previous studies (Cimiotti, 2006; Nardone et al., 2010).

## 4. RESULTS

The first information provided by the DEA deals with the relative efficiency of the eight LAGs. The assumptions underlying this specific analysis are the constant return of scale (CRS) and the Input-oriented approach. In this case, the technical efficiency indicates how the use of all inputs can be minimised by the LAG, while holding the same level of output.

The second information provided by the analysis are the weights obtained by the linear programming model, such that they can satisfy the constraints shown in the equation [1] for each LAG. The magnitude of the weight assigned to each input, represents its relative contribution to the efficiency level. Similarly, the same situation holds for output weights. These values show how each input or output contributes to the efficiency value and provide us some information on which is relatively more important to enhance the LAG's performance.

Table 3. Efficiency scores and relative weight

| Input-Oriented CRS | | | | | |
|---|---|---|---|---|---|
| | | Optimal weights | | | |
| | | Inputs | | Outputs | |
| LAG | Efficiency score | full-time jobs (1000 units) | Public Funds (million of Eur) | Social Capital | Private Investm. (million of Eur) |
| LAG-01 | 1.00000 | 0.208399 | 0.025500 | 0.199500 | 0.504833 |
| LAG-02 | 0.34663 | 0.102166 | 0 | 0 | 0.267403 |
| LAG-03 | 0.32648 | 0 | 0.315831 | 0.783546 | 0 |
| LAG-04 | 0.32884 | 0 | 0.334157 | 0.829010 | 0 |
| LAG-05 | 0.33065 | 0.110852 | 0 | 0.787263 | 0 |
| LAG-06 | 0.48202 | 0.114390 | 0 | 0.812388 | 0 |
| LAG-07 | 0.43045 | 0.104954 | 0 | 0 | 0.274700 |
| LAG-08 | 1.00000 | 0.168518 | 0.090700 | 0.710900 | 0.267094 |

Source: own elaboration

The average value of the score is 0.53, but relevant differences exist among them. As shown by the efficiency score of Table 3, there are two leading LAGs. On the contrary, the other LAGs show very low score, less than half of the leaders. The worst performance is exhibited by LAG-03.

By calculating the difference between 1 and the score value, we find the measure of the (relative) inefficiency, which indicates the percentage of radial reduction that should be applied to input, in order to achieve the full efficiency.

Another relevant outcome of the DEA is the calculation of weights, since they provide some suggestion for policy improvement. According to the results, it seems that many LAGs (03, 04, 05, 06) are inefficient since they show negligible values for the weights assigned to the private investments, meaning that LAGs actions are not appealing to private firms. However, it is worth mentioning that the inefficient LAGs should also reduce their input use. The Table 4

below reports the maximum reduction in inputs that should be applied by each LAG in order to increase its performance.

Table 4. Feasible inputs reduction

| LAG | full-time jobs | Public Funds |
|---|---|---|
| LAG-01 | 0.0% | 0.0% |
| LAG-02 | -65.3% | -76.3% |
| LAG-03 | -72.9% | -67.4% |
| LAG-04 | -70.3% | -67.1% |
| LAG-05 | -66.9% | -70.9% |
| LAG-06 | -51.8% | -73.3% |
| LAG-07 | -57.0% | -60.0% |
| LAG-08 | 0.0% | 0.0% |

Source: own elaboration

In the next step, we calculated the efficiency analysis under the assumption of variable returns to scale (VRS). Table 5 shows the efficiency score and the type of the returns of scale. In this case, the DEA provides the benchmark consisting in the *peer* references of each inefficient LAG. For an inefficient unit its peer refers to the nearest efficient units with respect to the frontier (Torgersen et al., 1996).

Table 5: Efficiency scores under VRS and peer references with benchmark

| Input-Oriented VRS LAG | Efficiency | Returns to Scale | | peer units with Benchmark | | |
|---|---|---|---|---|---|---|
| LAG-01 | 1.00000 | Constant | 1.000 | LAG-01 | | |
| LAG-02 | 0.46945 | Increasing | 1.000 | LAG-01 | | |
| LAG-03 | 0.52624 | Increasing | 1.000 | LAG-01 | | |
| LAG-04 | 0.55677 | Increasing | 1.000 | LAG-01 | | |
| LAG-05 | 0.50937 | Increasing | 1.000 | LAG-01 | | |
| LAG-06 | 0.53363 | Increasing | 0.825 | LAG-01 | 0.175 | LAG-08 |
| LAG-07 | 0.48226 | Increasing | 1.000 | LAG-01 | | |
| LAG-08 | 1.00000 | Constant | 1.000 | LAG-08 | | |

Source: own elaboration

The most frequent peer unit with benchmark is LAG-01. This approach provides insight on the unit reference from whom the 'best practices' should be learned. In addition Table 6 shows that less efficient LAGs face increasing return of scale, meaning that the inefficiency derives also from inadequate size of the LAG. Eventually this implies an enlargement of the existing LAGs (e.g. increasing the population or the economic size) or a merging of contiguous ones.

Table 6. Inefficiency of scale

| LAG | CRS efficiency score | VRS efficiency score | Inefficiency of scale |
|---|---|---|---|
| LAG-01 | 1.00000 | 1.00000 | 0.0% |
| LAG-02 | 0.34663 | 0.46945 | 26.2% |
| LAG-03 | 0.32648 | 0.52624 | 38.0% |
| LAG-04 | 0.32884 | 0.55677 | 40.9% |
| LAG-05 | 0.33065 | 0.50937 | 35.1% |
| LAG-06 | 0.48202 | 0.53363 | 9.7% |
| LAG-07 | 0.43045 | 0.48226 | 10.7% |
| LAG-08 | 1.00000 | 1.00000 | 0.0% |

Source: own elaboration

Here, we see that the share of inefficiency ranges from 10% to 41%, stressing that several inefficient units do not suit with their size. The concept of "size" for a LAG may relate with the number of stakeholders involved, or the magnitude of public funding and possible investments at local level.

## 5. CONCLUDING REMARKS

The evaluation of the material and immaterial outputs is a crucial issue in the domain of rural development programmes. In this paper we challenged the application of DEA as a tool to evaluate the efficiency of LAGs and provide information support for state/supra-state funding authorities in their control activities, and for enabling local authorities in the identification and learning process of "best practices". Specifically, an empirical exercise allowed us to explain the methodological steps and the usefulness of this technique. The DEA presents various advantages. Firstly, it considers several input and output that are heterogeneous, such as social capital, man-made capital, and natural resources, without the need to evaluate them in monetary terms. Secondly, it allows the comparison among several LAGs, identifying the best performances and the LAGs lagging behind. In addition, the post-optimal analysis allows to identify the causes of the inefficiency.

The results open the discussion on some other issue related to the existence of economies of scale. In fact, it emerges that less efficient LAGs are also undersized. Therefore, in order to address this problem, the structure of the LAG should be changed accordingly, eventually by enlarging the existing structure (e.g. increasing the population or the economic size) or by merging two contiguous LAGs.

In order to apply the methodology at a large scale, a reliable and consistent database of LAGs material and immaterial indicators is required. Certainly, an homogeneous measurement of social capital through standardised methods is the critical issue that should be carried out at EU or at the member state level.

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