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## Quantitative methods for sound financial management decisions in Romanian European Social Fund implementation

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### Abstract

European Social Fund has to be accurately implemented by Members' States authorities through projects developed by public and private national entities, according also to the principle of "sound financial management", described as the expression of the appropriate mix of economy of assigned resources, efficient allocation of resources toward indicators and effectiveness of financed operations. As long as ESF funding is trusted for implementation through a decentralized management mechanism to the Members' State Authorities, those have to comply with reporting objectives to the EC, as set into the European Regulations, including compliance to the "sound financial management" principle whose three components are specific, measurable, achievable, realistic and timely (SMART). Identifying the most appropriate quantitative methods that could be applied to the measurable elements may be seen as a first step in assisting both: management's decision towards implementation and reporting over the EC objectives. Our study tends to appropriate some quantitative models to the ESF implementation mechanisms, enhancing connections among ESF specific variables: project's budgets and number of individuals receiving labor market related services (also called project's indicators). Conclusions lead us to a series of quantitative models that may be practically used for assisting management's decision and reporting towards a sound ESF implementation in Romania.

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*Keywords:* Quantitative methods, OLS model, Variable costs, sound financial management;

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### 1. Introduction

Each ESF financed project has to contribute in a sound financial manner to the accomplishment of some program SMART indicators, relating the financing with labor market oriented services. Rates of fixed and variable costs reported to total cost of intervention could mean a lot for sound financial management of the ESF financed program. Useful data for managing this program may be obtained by modeling the evaluation process results in terms of regressions between approved budgets and series of indicators – estimated results of ESF financed interventions. Data interpretation and usage belongs to Managing Authority, Romanian public institution in charged with national ESF implementation, meaning launching, evaluating, monitoring and disbursing sums in specific ESF calls for proposals. We believe, and this is the hypothesis we are now testing, that evaluation comities accomplished their role in some reasonable manner, as long as there can be established a (strong) correlation between approved budgets and proposed indicators: professional orientation and training determining the efficiency and people proposed to be

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employed after the implementation of ESF projects, determining the effectiveness of the call for proposals evaluation process. Several studies have been made to assess quality of the programmes financed through ESF (Popa, Dragos, & Mare, 2011; Mare, Dragos, & Span, 2011). However, such studies have evaluated the quality of the activities related to the programmes and not their financial aspects. A quantitative survey for Phare was published back in 2010 (Dogar, C., & Kelemen A.). The financial analysis is important as lack of efficiency and effectiveness from this point of view would lead to cuts in the amounts of money coming from the European Union. For certain countries the post adhesion funds have created important effects in some economic sectors. A sectorial analysis in the service sector, including the educational services, with effects on the economic development was realized by Dragos & Dragos (2012). So we support our hypothesis through the above described linear regression models involving: budgets versus each of the indicators (number of persons receiving labor market related services – professional orientation, and training, and number of persons that found a job in a period of six months after participating in the projects, as a consequence of this). Fixed and variable costs have their widely accepted importance for management (Horngren, C.T., Datar, S.M. & Foster G., 2006)

## 2. Data and methodology

The present analysis is made on a sample of 101 projects financed through the European Structural Funds, in one call for proposals addressed to the long term unemployed persons, in summer 2010. Total budget of the sample population is 45,970,402.5 euro, representing 23.16% of the total amount available for this type of interventions.

The classical OLS econometric estimation method has been used for this cross-section of data. The endogenous variable is the budget of the projects, while the factors are given by the projects' indicators - the number of persons involved in the counselling activities, training activities and the number of participants in the first two groups that found a job in a period of maximum 6 months after (as a consequence of the participation in the project). Simple linear models were estimated to find the relationship between the budget and each of the exogenous variables.

$$y_i = b_0 + b_1x_{1i} + \varepsilon_i, \hat{b} = (X'X)^{-1}X'Y$$

Diagnosis tests were run to insure the validity of the models obtained.

The variables are:

**BUDGET<sub>i</sub>** – the budget of the project, in euro.

**PROF\_OR<sub>i</sub>** – the number of persons that participated in the professional orientation activities.

**TRAINING<sub>i</sub>** – the number of persons that participated in the training activities.

**EMPLOYMENT<sub>i</sub>** – the number of persons counseled or trained that found a job in a period of maximum 6 months after, as a consequence of the participation in the programme.

Regressions were constructed both with un-standardized and standardized coefficients. The latter variant transforms all the units in standard deviations allowing for comparisons between variables.

## 3. Results

A total of 45,970,402.5 euro was allocated for the analyzed sample of projects dedicated to the development of the human resource in Romania (SOPHRD-POS DRU). Throughout the activities there had to have been oriented as many as 28,843 individuals and similarly trained 17,980. However, only 1813 persons were declared as they will have found a job as a consequence of participating in the projects. Table 1 presents some other descriptive statistics of the four variables under analysis. The average project budget is 455,152.5 euro, but with more than half of the values situated above the mean. One can also see in table 1 the discrepancy that exists between the number of persons that had to have been oriented or trained and the impact of such program – finding a job. On average, the number of persons that will have found a job as a consequence of participating in the project is ten times smaller than the number of persons proposed to be trained. The difference is significantly higher when speaking about the orientation activities. The minimum values presented show that all the analyzed projects had the first type of

activity, but not all of them had the other two. This is not surprising, taking into account the fact that usually counselled persons become the subjects of the training activities and, later on, they search for a job. However, the relationship between the three groups is very important. This statement is based on the main objective of the HRD Program – money is given to improve qualification of the labour force and lower unemployment, especially for the under-privileged persons. Thus, the ratios between the three categories may be seen as efficiency indicators of the programmes.

The results are presented in table 2. As it can be seen, on average, not even half of the persons proposed in the orientation activities were also to be involved in the second stage, training. This is even worse when assessing employment. Only 4 persons in 100 oriented would have become employed as a consequence of the project activities. In the same time, on average, 7 out of 100 individuals proposed for training would have found a job after the projects implementation. Even in the presence of these inconsistencies to the general framework document for ESF implementation, efficiency and effectiveness of the ESF financed programme may be preserved as long as the medium unit cost proposed by the applicants stays about one half of the standard cost agreed with the EC.

Table 1. Descriptive statistics of the variables

Variable	Mean	Standard deviation	Minimum	Maximum	Median
BUDGET	455152.5	84739.92	80719.27	547029.6	482623.4
PROF_OR	290.03	230.11	30	1400	220
TRAINING	180.4	185.05	0	1600	145
EMPLOYMENT	18.13	23.3	0	150	11.5

Table 2. Relationships between the three types of activities

Ratio	Value
TRAINING / PROF_OR	0.46
EMPLOYMENT / PROF_OR	0.04
EMPLOYMENT / TRAINING	0.07

The correlation between the indicators is medium in intensity (between 0.3 – 0.7), while the budget is low (<0.3). The highest correlation coefficient is between training and employment – 0.59, followed by training versus professional orientation – 0.57, and finally employment versus professional orientation – 0.37. In the same time, the budget is mostly correlated with training (0.21). Based on the correlation coefficients, the most influencing is the number of persons to be trained (0.21), followed by the number of persons to be professionally oriented (0.18) and only on the last position the number of participants who found a job as a consequence of the projects (0.17).

The rest of the analysis focuses on the influence each of the three indicators has upon the budgets of the projects. The models are, as stated in the methodological part, simple linear models.

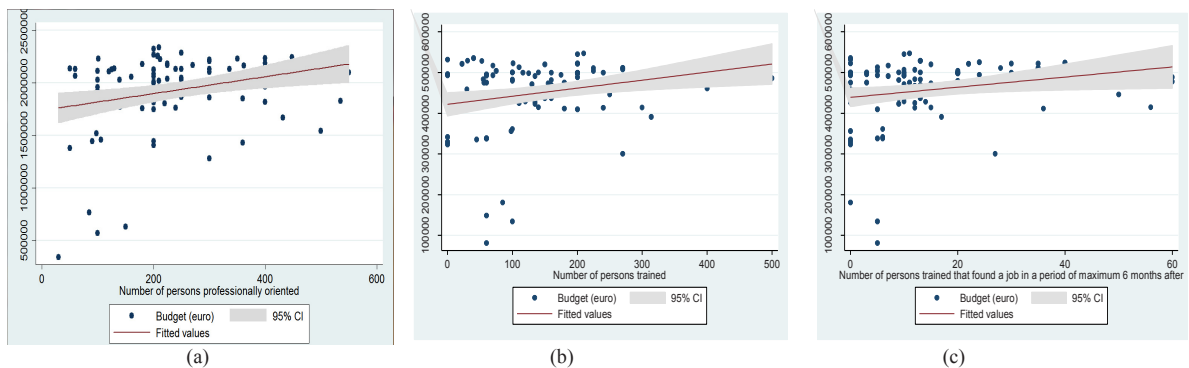


Figure 1. Budget versus professional orientation (a), training (b) and employment (c).

Multiple models could not be constructed as an individual could have participated in one, two or all the three types of activities, thing that causes multi co-linearity problems. Results are presented above. In all the cases, outliers were omitted to increase the validity of the models. Figure 1 presents the scatter plots between the budget and the three indicators.

### 3.1. Budget versus number of professional orientated individuals

The value of the budget depends in a proportion of 7.4% on the number of participants to the orientation activities. It is well-known that in a simple linear model the probabilities of the F and t tests are equal. Consequently, the overall significance of the model is given by the 0.004 value  $< 0.05$  (see table 4). For a project consisting in only one activity, which would be professional orientation, the fixed average costs would amount 407216.37 euro. Attracting one additional person to the courses would imply an average augmentation of the budget by 188.08 euro. Thus, the average unit variable cost per professional orientation of a person is of 188.08 euro. In standardized values, an increase of one standard deviation in the participants to the professional orientation activities leads to an augmentation of 0.29 standard deviations in the budget.

Table 3. Regression model – budget versus professional orientation

Budget	Coefficient	Standard error	t	P>  t	Beta – standardized coefficient
Prof. orientation	188.08	63.801	2.948	0.004	0.290
Constant	407216.37	18174.083	22.406	0.000	-

### 3.2. Budget versus number of persons trained

As in the case of the professional orientation activity, the training one also has a small influence upon the value of the budget (see figure 1(b)). The adjusted  $R^2$  has a value of 0.065 ( $> 0.0$ ), i.e. 6.5% of the variability of the budget is due to the training activity. The analysis has returned a value of 0.0063 for the probability of the Fischer test. This means that there is a valid influence of the number of participants in the training activity and the budget. The regression model is presented in table 5. As one can see, the fixed costs are, on average, higher than in the first case – professional orientation. Also the unit average variable cost is higher, for every additional person, an extra sum of 198.22 euro being necessary. An increase of 1 standard deviation in the participants in the training activities would imply an increase of 0.273 standard deviations in the budget.

Table 4. Regression model – budget versus training

Budget	Coefficient	Standard error	t	P>  t	Beta – standardized coefficient
Training	198.22	70.952	2.79	0.006	0.273
Constant	421865.1	14411.78	29.27	0.000	-

### 3.3. Budget versus number of persons that found a job in a period of maximum 6 months after participating in the programme

As expected, the relationship between the budget and the program impact, finding a job, is the weakest one. Only 4% of the budget's variation is influenced by the number of participants that due to this found a job in maximum 6 months after. A one standard deviation augmentation in the participants that would found a job in a period of 6 months after the courses finished has, as a consequence, for the budget an evolution of the same kind, but by only 0.223 standard deviations. The fixed costs expressed by the intercept of the model increases to 439026.2 euro, while the average unit cost/participant becomes almost ten times higher. Thus, for every additional person to get employed, the budget should increase on average by 1244.7 euro.

Table 5. Regression model – budget versus employment

Budget	Coefficient	Standard error	t	P>  t	Beta – standardized coefficient
Employment	1244.7	557.992	2.23	0.028	0.223
Constant	439026.2	11554.53	38.00	0.000	-

#### 4. Conclusions

The main goal of the present analysis was to confirm that, the Managing Authority (EC Regulation 1083) has performed its task in evaluating projects according to the sound financial management principles: economy, efficiency and effectiveness (Performance audit manual, [www.eca.eu](http://www.eca.eu)). As a premise of efficiency and effectiveness we may state that correlations exist between approved budgets and proposed indicators, even if a consistent part of fixed costs were found for all the three linear regressions defined. Projects have been approved back in 2010 taking into consideration possible relationships between sums and number of persons involved in projects activities. The analysis has emphasized that improvements should be made in respect to the final goal of such projects – lowering unemployment. Unfortunately, multiple models could not be constructed as the exogenous variables are interconnected, leading to multi co-linearity problems. Consequently, we may state that there is little chance to be able to construct a general model to be used in future project writing actions. Moreover, we must also observe that higher order models better describe the existing relationships between the budget and the three indicators. However, they are harder to interpret and use.

Economy of the program is ensured by the average unit cost of the services, situated at about one half of the one accepted by the EC at program approval. Efficiency and effectiveness are to be discussed taking further into consideration not only the evaluation process but also the influence of monitoring activities performed during 2010, 2011 and 2012. Financial corrections applied to the beneficiaries affected by means of increasing the economy as well.

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