ALTERNATIVE FINANCING OF SMART AND SUSTAINABLE BUSINESS IDEAS

Alternate financing of smart and sustainable business ideas

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Abstract

This paper describes the impact of assessment or evaluation criteria on the selection of projects co-financed by EU structural funds. By multiple criteria method of selection four representative groups of projects were ranked based on quantitative financial and qualitative non-financial criteria. The first group of criteria relates to financial data from past statements and the second group of criteria relates to the content of the project idea and the quality of the applicant. Inappropriate criteria result in the co-financing of inappropriate projects, whose effects do not benefit the vision of smart and sustainable economy of EU.

Keywords: EU structural funds, project assessment, Multiple Criteria Decision Analysis, Ranking

1. Introduction

The European Commission defined three key priorities for development to 2020 [European Commission 2010]: smart growth, sustainable growth and inclusive growth. It predicts an economy, shaped by a high level of employment, productivity and social
cohesion. It calls all Members to adapt their national goals and measures to these guidelines.

By 2020, the European and national contracting authorities will publish numerous centralised and decentralised calls from different areas, which would contribute to achieving the abovementioned strategic guidelines. The demand for European funds is almost always greater than the funds at disposal and this is why applications need to be evaluated according to the predetermined criteria. The question, which comes to mind, is how to fairly evaluate the applications and allocate financial incentive to prospective projects, which will be successfully carried out.

Selection of qualitative projects is not a simple task and the dilemma on what is the condition for successful project implementation is always present. Are we looking for an appropriate applicant or appropriate project? Is it better to back up a financially stable applicant with excellent past business operation and average idea or an innovative project, which will have an effect on a wide number of people, but it would carried out by a financially less reliable applicant?

The answer to this dilemma is not self-evident and every contracting authority or evaluator of applications co-financed by EU structural funds, faces this dilemma.

This research work examines the exposed dilemma and explains the consequences of unilateral criteria. It will prove that merely quantitative financial criteria or exclusively qualitative non-financial criteria are not appropriate for selecting the right projects. It will explain the consequences of inappropriate ranking and selection of projects. The research work concludes with the finding that we need to form multiple correlation criteria with appropriate weights for selecting prospective projects. At the same time the evaluators need to have enough maturity and experience to be able to recognise “beyond the state of the art” projects.

2. Methodology

Selecting the best project in any field is a problem, which like many other decision-making problems, is complicated because projects usually tend to have more than one aspect in terms of measurement, and therefore, involve more than one decision maker [Rouyendegh and Erol 2012].

The selection among companies or projects applying for financial support from a restricted budget constitutes a typical ranking problem where the decision maker is called to single out the most attractive alternatives by taking into account different aspects of projects. Multiple Criteria Decision Analysis (MCDA) methods [Belton and Stewart 2002; Tzeng and Huang 2011] are widely used in the complex decision making of ranking the projects.

Several outranking methods have been proposed to help selecting and ranking (evaluating) the projects [Al-Rashdan et al. 1999; Brans and Mareschal 2005; Ginevicius et al. 2008; Halouani et al. 2009; Mavrotas et al. 2006; Mavrotas et al. 2008], but ELECTRE [Belton and Stewart 2002; Görecka 2007; Mavrotas et al. 2006; Rouyendegh and Erol 2012] seems to be the most promising one.

This is why this paper examines the ranking of four representative groups of projects by the ELECTRE methodology [Belton and Stewart 2002] based on two completely different types of criteria. In the first case, evaluation and ranking takes place based on quantitative financial criteria. In second case, ranking takes place based on qualitative non-financial criteria. Such ranking is completely real and fits the state in the field.
The ELECTRE methods, first presented by Bernard Roy [Roy 1996] are based on the evaluation of two indices, namely the concordance index and the discordance index, defined for each pair of options a and b. The concordance index $C(a,b)$ measures the strength of support in the information given, for the hypothesis that a is at least as good as b. The discordance index $D(a,b)$ measures the strength of evidence against this hypothesis (it measures the degree to which b is strictly preferred to a).

The concordance index used in ELECTRE I is defined as [Belton and Stewart 2002]:

$$C(a, b) = \frac{\sum_{i \in Q(a,b)} w_i}{\sum_{i=1}^{m} w_i}$$

where $Q(a,b)$ is the set of criteria for which a is equal or preferred to (at least as good as) b.

The concordance index is the proportion of criteria weights allocated to those criteria for which a is equal or preferred to b. The index takes on values between 0 and 1 (the higher values indicate stronger evidence in support of the claim that a is preferred to b).

The discordance index suggested for ELECTRE I is given by

$$D(a, b) = \max_{i \in R(a,b)} \frac{\max_{i \in m, c, d \in A} |w_i (z_i(c) - z_i(d))|}{\max_{i \in m, c, d \in A} |w_i (z_i(c) - z_i(d))|}$$

where $R(a,b)$ is the set of criteria for which b is strictly preferred to a and A is the set of all alternatives.

The discordance index for a compared to b is the maximum weighted value by which b is better than a, expressed as a proportion of the maximum weighted difference between any two alternatives on any criterion. This also takes on values between 0 and 1, with a high value indicating that on at least one criterion b performs substantially better than a, thus providing counter-evidence to the claim that a is preferred to b.

However, the form of this index means that it is only appropriate if all evaluations are made on a cardinal scale and the weights render scales comparable across criteria, which are quite restrictive assumptions. An alternative approach is to define a veto threshold for each criterion i, say $t_i$, so that a cannot outrank b, if the score for b on any criterion exceeds the score for a on that criterion by an amount equal to or greater than its veto threshold.

That is

$$D(a, b) = \begin{cases} 1 & \text{if } z_i(b) - z_i(a) > t_i \text{ for any } i \\ 0 & \text{otherwise} \end{cases}$$

Next, we have to specify concordance and discordance thresholds, $C^*$ and $D^*$:

If $C(a,b) > C^*$ and $D(a,b) < D^*$ then a outranks b.
If $C(b,a) > C^*$ and $D(b,a) > D^*$ then b outranks a otherwise b does not outrank a.

It is also required, that $C(a,b) \geq C(b,a)$ - to reduce the possibility of two alternatives each outranking the other.

The values for $C^*$ and $D^*$ are specified for a particular outranking relation and they may be varied to give more or less severe outranking relations: the higher the value
of $C^*$ and the lower the value of $D^*$, the more severe the outranking relation, that is, the more difficult it is for one alternative to outrank another.

3. Selection standards and criteria

During the first stages of implementing the European cohesion policy in EU Member States, the co-financing applications were ranked based on arrival date. They were approved administratively complete, appropriate in content, which reached the minimal threshold. Calls were open until the funds were used up. More than the quality of an application speed was what mattered. It turned out that this method did not attract enough qualitative projects, because speed and quality often exclude each other. This is why this ranking methodology is no longer used today.

In the current financial perspective 2014-2020, the European structural funds are available at closed-type calls. Each call has one or several deadlines for application. The arrived applications are ranked in the same way. Administratively complete applications are handed over to evaluators, who on the basis of predetermined criteria evaluate and rank the applications. Nearly always there are more applications than disposable funds, so only the highest ranking applications are co-financed.

The evaluation standards and selection criteria are determined by the contracting authority. There is a wide array of quantitative and qualitative criteria.

Quantitative criteria compare numerical data based on mathematical-statistical methods. The results are measurable and objectively comparable and the reliability of ranks depends on the qualitative of entry data – inputs. Wrong ranking happens because of wrong or incomplete inputs.

Qualitative criteria allow for subjective assessment of the evaluator and human error. Wrong selection is the consequence of poor project presentation, lack of knowledge, not understanding the content or a disinterested evaluator.

Financial criteria fall into the group of quantitative criteria, whereas the group of qualitative criteria comprises of non-financial criteria.

Quantitative financial criteria compare:
- data from current balance sheets (e.g. income, profit, labour costs),
- relationship between realised and forecast items (e.g. growth of income in two periods – upon submission of the tender and upon project completion),
- indicators (e.g. value added per employee, productivity, profitability, indebtedness),
- statistical data (GDP per capita, development threat of geographical areas).

Qualitative financial criteria compare:
- the innovation behind the ideas, concepts, models,
- level of relevance of European problems, which the projects address,
- the quality of proposed solutions, applicants and partners,
- the breadth of impact to target groups.

The appropriate criteria are criteria, which exclude senseless, unrealistic and not potential projects and enable breakthrough ideas being realised. Attentive readers can gather from the prescribed criteria and weights what it is that the evaluators expect from them and which are the key stresses. The idea is that the criteria within programmes in
financial perspective are unified as much as possible. An example of such practice is the Horizon 2020 Programme [European Commission 2011], where the criteria for all programmes are unified. The only differences are weights, thresholds for individual criteria and overall thresholds.

4. Case study
4.1. Basis

Below are presented four representative projects, which include the four groups of project applications. Our role is to select two for co-financing by the EU structural funds.

The information about the representative projects are the following:

- **Representative project 1 (P1):** The applicant is a company, which has been operating for 7 years, has 20 employees, mostly young and creative people. It has invested a great deal in the past and it is greatly indebted. It has 5 successfully carried out development projects. The applied project marks an excellent idea, which solves a specific problem a wide number of people face.

- **Representative project 2 (P2):** The applicant is a company, which employs 85 below average interested people, which are not interested in research projects. It has been present on the market for 20 years; it is somewhat indebted, without previous development investments. The applicant is inflexible. The application project is below average and without real development possibilities.

- **Representative project 3 (P3):** The applicant is a company, which has been operating for 12 years and has 40 employees. The high level of the current indebtedness is a result of poor choices in the past. The applicant has good ideas and in-house products. It annually covers a tenth of the retained loss. The application project is well-structured and contains a good solution to the problem.

- **Representative project 4 (P4):** The applicant is a company established a year ago; a complete stranger on the market. Two employees, highly motivated and educated have excellent ideas and high level of motivation for changes. The project proposal presents an interesting concept of a problem solution for a wide number of users. During studies they participated in development projects.

Table – 1 contains the information on individual representative projects.

<table>
<thead>
<tr>
<th>Applicant size (taken from [European Commission 2008])</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indebtedness</td>
<td>small</td>
<td>medium</td>
<td>small</td>
<td>micro</td>
</tr>
<tr>
<td>Reason for indebtedness</td>
<td>past investments</td>
<td>inflexibility</td>
<td>poor past operation</td>
<td>-</td>
</tr>
</tbody>
</table>
The projects will be ranked from top to bottom. We will need to find a project, which will provide long-term economic, social and territorial cohesion. This project will:

- provide a solution for a European problem,
- enable the commercialisation of an innovative product/service,
- encourage additional employment,
- include educated and young people (in terms of employment, mobility, life-long learning),
- contribute to low-carbon economy.

Ranking will take place based on the ELECTRE methodology taking into account the two types of criteria. In the first case project ranking will take place based on five quantitative financial criteria. In the second case projects will be ranked according to seven qualitative non-financial criteria. The weights from 1 to 10 will be determined so that 1 represents least and 10 most value.

### 4.2.1. Ranking of projects based on quantitative financial criteria

Evaluation of projects based on quantitative financial criteria and weights are displayed in Table – 2. They relate to financial data from previous statements and forecasts.

**Table – 2: Decision matrix of the criteria for projects**

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>Income</th>
<th>Financial indicators (productivity, economy)</th>
<th>Current financial fitness</th>
<th>Indebtedness</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>3</td>
<td>8</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>P2</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>P3</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>P4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

*Source: own research.*
Outranking relation is built on the concordance $C(a, b)$ and discordance $D(b, a)$ indices of each pair of options. Values for $C(a, b)$ where $a$ is the project given in the row and $b$ is the project given by the column, are represented in the Table – 3.

Example: $C(P_1, P_2)=(4)/(3+8+4+10+6)=0.13$

**Table – 3: Matrix of concordance indexes**

<table>
<thead>
<tr>
<th></th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>1.00</td>
<td>0.13</td>
<td>0.90</td>
<td>0.45</td>
</tr>
<tr>
<td>P2</td>
<td>0.87</td>
<td>1.00</td>
<td>1.00</td>
<td>0.81</td>
</tr>
<tr>
<td>P3</td>
<td>0.10</td>
<td>0.00</td>
<td>1.00</td>
<td>0.81</td>
</tr>
<tr>
<td>P4</td>
<td>0.19</td>
<td>0.19</td>
<td>0.52</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Source: own research.*

Discordance threshold is set at 3 scale points for each criterion. It means that alternative $a$ cannot outrank $b$ if $b$ is 3 or more points higher. Table – 4 represents the Matrix of discordance indexes.

**Table – 4: Matrix of discordance indexes**

<table>
<thead>
<tr>
<th></th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>P2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>P3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>P4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Source: own research.*

Next step is to specify concordance and discordance thresholds, $C^*$ and $D^*$:

$C^*=0.80$ and $D^*=0.10$.

Figure – 1 represents the outranking relation.

**Figure – 1: Outranking relation for $C^*=0.80$**
P2 outranks P1, P3 and P4. P1 outranks P3. P3 and P4 do not outrank any alternative.

A stronger outranking relation by increasing $C^*$ to 0.90 gives the outranking relation presented in Figure – 2.

**Figure – 2: Outranking relation for $C^*=0.90$**

![Outranking relation for C*=0.90](source: own research)

Taking the weak and strong outranking relations required by ELECTRE gives the following order:

1) P2
2) P1
3) P4
4) P3

Based on the assumption that because of the limited budget only two out of four projects will be financed, the selected projects are P2 and P1. The common point of the selected projects is financial stability of the applicants.

The highest ranking project is P2, which will be implemented by a financially stable applicant in a traditional mode of operation, long-term contracts for “loan transactions” without own development projects and without any revolutionary ideas. It is not interested in international developmental projects, the European added value or use of results for research purposes. The co-financing of such a project only contributes to strengthening the individual applicant and not to an international industrial expansion and intersectoral use of development results. The use of financial funds in this case does not impact the strengthening of the innovation chain, enrich the European research space or solve European problems. This is why this choice is not wise and does not contribute to the transformation of Europe in terms of a vision of social market economy, as set in the key document Europe 2020 strategy [European Commission 2010].

Under the financing threshold is the applicant of project P4, because it is a young company without concrete financial results. It has been present on the market for one year, therefore has not been able to prove its financial stability. In this year it has tried to make its breakthrough on the market, to network and promote its ideas, therefore its balance sheet is understandably weak. Its needs for financing development potential are the highest, but it does not receive the funds. The calculations show that newly-founded companies are less privileged.
Quantitative financial criteria assess only the applicant and not project content. Therefore, ranking projects exclusively based on quantitative financial criteria is not appropriate.

4.2.2. Ranking of projects based on qualitative non-financial criteria

We repeat the procedure of ranking the projects, this time based on the decision matrix from Table – 5.

Table – 5: Decision matrix of the criteria for projects

<table>
<thead>
<tr>
<th></th>
<th>Past development projects</th>
<th>Company references and project leaders</th>
<th>Branch prospects</th>
<th>Project results dissemination</th>
<th>Idea, content</th>
<th>Sales potential</th>
<th>Impact on the environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weights</strong></td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>10</td>
<td>6</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td><strong>P1</strong></td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td><strong>P2</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>P3</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>P4</strong></td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: own research.

Qualitative non-financial criteria assess the content of the project idea, the quality of the applicant, branch potential and commercialisation and the impact of the project on the target groups and the environment. There is no assessing of financial adequacy of the applicants in this case.

Table – 6: Matrix of concordance indexes

<table>
<thead>
<tr>
<th></th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P1</strong></td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.72</td>
</tr>
<tr>
<td><strong>P2</strong></td>
<td>0.00</td>
<td>1.00</td>
<td>0.15</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>P3</strong></td>
<td>0.09</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>P4</strong></td>
<td>0.70</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: own research.

Discordance threshold is set at 3 scale points for each criterion. Table – 7 represents the Matrix of discordance indexes.

Table – 7: Matrix of discordance indexes

<table>
<thead>
<tr>
<th></th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P1</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>P2</strong></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>P3</strong></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>P4</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: own research.
C*=0.80 and D*=0.10.

Figure 3 and Figure 4 represent the outranking relations. P1 outranks P2 and P3. P4 outranks P2 and P3. There is a circuit in the graph comprising P1 and P4 (P1 outranks P4 and P4 outranks P1) when C*=0.65.

**Figure – 3: Outranking relation for C*=0.80**

![Outranking relation for C*=0.80](source: own research)

**Figure – 4: Outranking relation for C*=0.65**

![Outranking relation for C*=0.65](source: own research)

Taking the weak and strong outranking relations required by ELECTRE gives the following order:

1) P1
2) P4
3) P3
4) P2

According to this ranking system the selected projects for co-financing are P1 and P4. These are innovative projects in content managed by motivated employees. Financial support would go to projects, which will raise the level of economic activity, improve the competitiveness of economy, and strengthen human potential and forward new research, technological and innovative knowledge.

The project applicant P4 is a newly-founded company with above average ideas, which in this type of ranking obtains the co-financing. Regarding the fact that the company has to secure its own funds (per average 30% - 40%) there is a risk that the...
project will not be realised in the foreseen scope. In the extreme event, when there are more such cases, the funds remain unabsorbed.

Own funds are therefore the reason why completely ignoring financial criteria is not acceptable. Innovative ideas are an essential condition for remedying the European structural deficits, but only financially fit applicants can implement them, who will contribute their own share of funds on time and in the appropriate amount. Therefore, ranking projects exclusively based on qualitative financial criteria is not appropriate.

5. Conclusion

Selection of projects co-financed by EU structural funds depends on the predetermined criteria and weights.

Quantitative financial criteria evaluate the financial stability of the project. Projects are ranked based on the financial state. Newly-founded companies rank lower, because they are not as financially stable. Distributing EU funds among financially strong applicants in the long-term could lead to the distortion of competition. Financially strong business entities would become stronger and financially weak would never reach appropriate business opportunities.

By evaluating only with qualitative non-financial criteria, the projects are ranked on the basis of the idea, content, references and impact. Innovative ideas are the drivers of progress and development, but without the proper financial support they cannot succeed. In projects co-financed by EU structural funds, own personal funds are always required, which applicants have to provide from past or current business operation.

The use of only quantitative financial or qualitative non-financial criteria is not appropriate. What is required is an integral combination of both types of criteria. The criteria are not inappropriate by themselves; only the combination is inappropriate, which favours only one point of view and neglects the other.

The ELECTRE methods are appropriate for ranking projects co-financed by EU structural funds. It provides ranking from top down according to the predetermined criteria according to a prescribed procedure.

In a comprehensive evaluation of the projects an important part of the evaluation apart from the criteria and weights is also the evaluator. He or she has to assess objectively in line with the guidelines of European programme documents. He or she has to rank the projects so that projects with innovative ideas and those implemented by financially stable applicants with competent employees will be co-financed. The role of the contracting authority is to make up a combination of such criteria, which will enable such ranking.

References

Apstrakt

Ovaj rad opisuje uticaj procene ali vrednovanja kriterijuma o izboru projekata sufinansiranih iz strukturnih fondova Evropske unije. Metodom selekcije pomoči višekriterijuma četiri reprezentativne grupe projekata rangirane so na osnovu kvantitativnih finansijskih i kvalitativnih nefinansijskih kriterijum. Prva grupa kriterijuma se odnosi na finansijske podatke iz prethodnih izjava, a druga grupa kriterijuma odnosi se na sadržaj projektnih ideje in kvalitet podnosa zahteva. Nepriljubljeni kriterijumi rezultiraju v sufinansiranju neodgovarjalnih projekata, čiji efekti ne koriste vizijo pametne in održive privrede Evropske unije.

Ključne reči: EU strukturni fondovi, procena projekata, analiza višestrukih kriterijum odloka, rangiranje