Software application for uniform quantitative evaluation of social economy projects

B Florea¹, D Marcu¹*, A Ioana¹, A Semenescu¹, R Solea¹, G Iacob¹ and F Niculescu¹
¹University Politehnica of Bucharest, Engineering and Management of Metallic Material Department, Splaiul Independenței Street No. 313, Romania

Abstract. The qualitative impact calculation for the implementation of a social economy project can be done using dedicated computing software. In this paper we have defined PQS which is an application on JAVA support that allows use irrespective of the existing support platform on the computer. The created application has the advantage that it can run both on computers and on other devices (tablets, phones, etc.). The input data are represented by the values assumed and realized in the project and are stored in a MySQL database.

1. Introduction
The advantage of using the software created and presented in this article is that it allows the automatic loading of data taken from different databases by automatically calculating a complex indicator. The evaluation of the degree of accomplishment of the different projects, from different fields of activity can be done in this way in a much simpler and at the same time transparent way. The programming language used in the development of the application allows the integration of the application in the management system of the Structural and Cohesion Funds, thus being able to become a valuable tool for real-time verification of the project realization stage. Such an application can be useful both for the managing authorities and for the beneficiaries and project implementers. The great advantage is the possibility of application in heterogeneous fields of activity, allowing comparisons even between projects from totally independent fields. The managing authorities in Romania, at present, manually and non-uniformly evaluate the implementation of the projects. By achieving a complex indicator and digitizing the calculation mechanism, a much more objective and correct evaluation is allowed, both static and dynamic, of the implementation stage. Given the realities in the field of project implementation, discussions with both the beneficiaries and the managing authority, we considered it useful to carry out a software to automate the previously defined indicator.
Starting from Project Quality Score, we can create a computerized system to evaluate social economy projects, using the JAVA language for application development.

Project quality indicator can be defined as:

\[
P_{QS} = (\sum_{a=1}^{n} t_a \times p_{at}) \times p_t + (\sum_{a=1}^{m} p_{ia} \times p_{ai}) \times p_i
\]

with

- \(P_{QS}\) = Project Quality Score,
- \(t_a\) = target group value,
- \(p_{at}\) = importance of the element,
- \(p_{t}\) = importance of target group in indicator,
- \(p_{ia}\) = project indicators value,
- \(p_{ai}\) = importance of the element,
- \(p_{i}\) = importance of project indicators value.

2. Working Methodology

2.1. Logical scheme

For the achievement of this application, we start from the logical scheme for calculating the values of the indicator. Sitetic. The logical diagram is presented in the figure below.
2.2. Discussions

The input values are represented by the values assumed and realized in the project, according to the table below.

| Indicators                                      | Prognosis | Achievement |
|------------------------------------------------|-----------|-------------|
| **Immediate production indicators (output)**   |           |             |
| Number of incorporated social economy structures | 11        | 11          |
| Number of people benefiting from guidance / counselling - social economy | 125      | 147         |
| Number of participants in training - social economy | 136      | 135         |
| Number of ESF participants - women              | 15        | 19          |
| Number of ESF participants - Roma persons       | 25        | 32          |
| Number of ESF participants - people with disabilities | 15    | 31          |
| Number of ESF participants - other vulnerable groups | 70      | 65          |
| Number of communication and promotion events - social economy | 2       | 0           |

| Result indicators                               |           |             |
| Number of jobs created by social economy structures | 46        | 47          |
| Number of certified training participants - social economy | 125    | 135         |
| Number of jobs maintained by social economy structures | 46      | 47          |

| Target group                                    | Prognosis | Achievement |
|------------------------------------------------|-----------|-------------|
| **Women**                                      |           |             |
| Women families having more than 2 children      | 4         | 8           |
| Mono-parental families                          | 4         | 1           |
| Managers of the social enterprises              | 15        | 20          |
| People who left school early                    | 3         | 4           |
| People living from the guaranteed minimum income | 20       | 9           |
| Persons with disabilities                       | 8         | 14          |
| Roma people                                     | 10        | 13          |
| Young people over 18 leaving the institutionalized child protection system | 3         | 0           |
| **Men**                                        |           |             |
| Women families having more than 2 children      | 6         | 4           |
| Mono-parental families                          | 1         | 1           |
| Managers of the social enterprises              | 0         | 0           |
| People who left school early                    | 7         | 6           |
| People living from the guaranteed minimum income | 20       | 9           |
| Persons with disabilities                       | 7         | 17          |
| Roma people                                     | 15        | 19          |
| Young people over 18 leaving the institutionalized child protection system | 2         | 0           |

At launch time the software application is loaded with the data from the two tables, taking over from the created database, as in the figure Figure 2.
Figure 2. Launching PQS software application

Records downloaded automatically can be validated and manually modified in the application as are presented in figure 3 and figure 4.

Figure 3. Adding records in database for target group
Figure 4. Adding records in database for project indicators

The intermediate calculation values of the complex indicator of project quality are calculated automatically and are offered as values available for further analysis of project efficiency and effectiveness.

Based on these data, the application calculates the general indicator according to the formula (1). The result is presented in figure 5.

\[
P_G = (\sum_{a=1}^{n} t_a \times p_{at}) \times pt + \left(\sum_{a=1}^{m} p_{ia} \times p_{ai}\right) \times pi = 0.9087
\]

Figure 5. Calculated result

The Java language used in the development of the application is a very secure programming language, providing strict security mechanisms for the programs materialized by: dynamic verification of the code for the detection of dangerous sequences.

Also, when choosing the application development platform, it was taken into account that it is a language independent of the work platform, without the need to recompile it on different operating systems such as Windows, Linux, Mac OS, Solaris, which brings substantial savings to application development companies as well as the possibility of running this software in the cloud.
The application ensures a management of the resources of the hardware equipment on which it runs, being optimized to work even on mobile media such as phones, tablets.

3. Conclusions
The application allows the storage of intermediate values in the database, so that later the results can be analyzed, providing graphs with the evolutions of the degree of project accomplishment.

At the same time, the application can be a facility for management bodies in order to automatically measure the fulfillment of the indicator.

Among the advantages of the application we mention:
- Operation regardless of the operating system
- Does not require licensing costs, being made using the java support (open source)
- The application can be scaled to the level of multiple sectors of activity in the national economy, considering the general character of the application
- In the general conditions of company computerization, as well as in the current, particular conditions generated by the COVID pandemic, we consider that this instrument can constitute a valuable basis for ensuring a secure project management.

As it can be seen in the study, such software allows a real-time analysis of the degree of realization of the project indicators and the target group.

The analysis is qualitative, but with comparable results in terms of both the evolution over time and between projects in non-unitary fields of activity.

In the current period, the vast majority of projects that are implemented at European level are based on the assumption that two objectives are met: A well-defined and well-aimed at target group and measurable and traceable project indicators.

The main advantage of the complex indicator of the quality of projects, especially as a result of the realization of a software that automatically processes the data received from both the beneficiaries and the managing authorities, is given precisely by the possibility of achieving this in an automatic and objective manner.

References
[1] Marcu D, Costoiu M, Semenescu A, Ioana A, Tufceanu D, 2019, *Quantitative measurement of the quality of a social economy project*, 23rd International Conference on INNOVATIVE MANUFACTURING ENGINEERING AND ENERGY
[2] Frijns P, Van Leeuwen F, Bierwolf R, 2017 *Project management-a more balanced approach*, Technology & Engineering Management Conference (TEMSCON), IEEE, pp 234-238
[3] Harrison F, Lock D, 2016 *Advanced project management: a structured approach*, ISBN 9781138270633, Ed. Routledge, p 336
[4] Harris E, 2009, *Strategic project risk appraisal and management*, ISBN 9780566088483, Ed. Routledge, p 126
[5] Tanasa S, Andrei S, Olaru C, 2007, *Java de la 0 la expert*, ISBN:9789734624058, Ed Polirom, p 560
[6] Stanciu I, Paraianu E, Schileru I,1998, *Calimetrie I.*, ISBN 973-9264-34-4, Ed Oscar Print Bucuresti, p 321
[7] Paraschivescu O A, 2006, *Managementul calității, ediția a II-a revizuită si adăugită*, Ed Tehnopress, p 248